

**DEVELOPMENT OF THE ONTARIO  
PROVINCIAL SEDIMENT QUALITY  
GUIDELINES FOR POLYCYCLIC  
AROMATIC HYDROCARBONS (PAH)**

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QUALITY GUIDELINES FOR POLYCYCLIC AROMATIC HYDROCARBONS (PAH)**

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## PREAMBLE.

The Provincial Sediment Quality Guidelines are a set of numerical guidelines developed for the protection of aquatic biological resources. The methods used in setting these guidelines, and the calculation and data evaluation methods are described in detail in Persaud *et al* (1993).

The guidelines set out in this document have defined three levels of ecotoxic effects.

1. A No-Effect Level at which no toxic effects have been observed on aquatic organisms. This is the level at which all biological resources will be protected. Other water quality and use guidelines will also be met at this level. This level is also intended to protect against biomagnification through the food chain.
2. A Lowest Effect Level indicating a level of sediment contamination at which the majority of benthic organisms are unaffected.
3. A Severe Effect Level indicating the level at which pronounced disturbance of the sediment-dwelling community can be expected. This is the sediment concentration of a compound that would be detrimental to the majority of benthic species.

The No-Effect Level guideline is calculated on the basis of the Equilibrium Partitioning method described in Persaud *et al* (1993). The method uses Provincial Water Quality Objectives/Guidelines, which have been designed to protect against biomagnification as well as all other sensitive water uses. A guideline is derived by multiplying the PWQO or PWQG by organic carbon-normalized partition coefficients ( $K_{oc}$ ) to derive a sediment guideline. The mean of these values becomes the

## No-Effect Level.

Both the Lowest Effect Level and the Severe Effect Level guideline levels are derived using the Screening Level Concentration method described in Persaud *et al* (1993). The SLC method makes use of field data on sediment concentrations of contaminants and the co-occurrence of benthic invertebrate species. The calculation of the SLC is a two step process and is calculated separately for each parameter. In the first step, for each parameter the individual SLCs (termed Species SLCs) are calculated for each of the benthic species. The sediment concentrations at all locations at which that species was present are plotted in order of increasing concentration. From this plot, the 90th percentile of this concentration distribution is determined. The 90th percentile was chosen to provide a conservative estimate of the tolerance range for that species. This would serve to eliminate extremes in concentrations that may be due to specific and unusual sediment characteristics. The 90th percentile is that locus below which 90 percent of the sediment concentrations fall.

In the second step, the 90th percentiles for all of the species present are plotted, also in order of increasing concentration. From this plot, the 5th percentile and the 95th percentile are calculated. These represent the concentrations below which 5 percent and 95 percent of the concentrations fall. The concentration of a contaminant at the 5th percentile becomes the Lowest Effect Level while the concentration at the 95th percentile becomes the Severe Effect Level.

This document details the derivation of the Provincial Sediment Quality Guidelines for 12 individual polycyclic aromatic hydrocarbons (PAH) as well as for Total PAH, and summarizes the data used to derive these values. The document also summarizes the fate of polycyclic aromatic hydrocarbons in sediments and provides the necessary details of the calculations of the sediment quality guidelines.

## INTRODUCTION

Polycyclic aromatic hydrocarbons comprise a large class of compounds that are based on a chemical configuration of two or more benzene (aromatic) rings. Some polycyclic aromatic hydrocarbons are naturally occurring compounds; they are major constituents of all fossil fuels such as oil and coal and have been found as minor constituents of nearly all sedimentary rocks (Hunt, 1961). Other compounds are by-products of the incomplete combustion of fossil fuels. While the presence of PAH compounds in sediments can be due to natural weathering of sedimentary rock, their historical distribution in sediments is primarily due to the pyrolysis of organic matter. The most common sources of PAH are forest fires and volcanic activity.

Anthropogenic sources appear to be the major sources of PAH compounds in sediments. These are primarily due to the incomplete combustion of fossil fuels, processing by-products of oil and coal, runoff from urban roadways (asphalt), and petroleum spills. The sources can be through direct input into water, as in the case of effluent discharges from manufacturing (wood distillation, coking operations, manufacture of roofing tar and road tar, and refining and application of creosote) and spills of petroleum products, or through indirect losses, such as non-point source runoff. The latter has been especially significant in urban areas as a result of atmospheric fallout of the combustion products from internal combustion engines and, perhaps more importantly, the weathering of asphalt roadways. Many of the PAH compounds are extremely stable and persistent.

The ultimate fate of most of these compounds in aquatic systems is complexing to ligands and deposition in the sediments. The relative length of time that a compound remains in solution depends on its structure, solubility and hydrophobicity. Highly insoluble compounds can rapidly partition to organic particles and settle to the sediments while the more water soluble compounds may remain in solution for longer periods of time. The solubility, therefore, has a direct bearing on the ultimate fate of a compound, with the more soluble compounds generally lost more readily from solution, through volatilization

and transformation, than the insoluble compounds.

PAHs are a diverse group of compounds all based on benzene ring structure which range from two (naphthalene) to seven (coronene). They have often been divided into two major groups: low-molecular-weight compounds and high-molecular-weight compounds. There is no clearly defined division between the two groups and for the purposes of this document two and three ring structures are considered as low molecular weight compounds while structures of four or more rings are considered as high molecular weight compounds.

Environmental persistence has been found to vary according to the molecular weight. Low molecular weight compounds appear to be more readily degraded than high molecular weight compounds. Thus, compounds such as naphthalene will tend to degrade relatively quickly while compounds such as benzo(a)pyrene will tend to persist for varying periods depending on the level of microbial activity. The primary transformation process in sediments appears to be biological (microbial) degradation. Photolysis, the other major transformation process, would play a minor role in sediment-sorbed PAH decomposition.

The remainder of this document briefly describes the fate of each of the compounds in the aquatic system and details the derivation of the No-Effect Levels, the Lowest Effect Levels and the Severe Effect Levels.

## Anthracene

### i. Aquatic Fate

Anthracene is a common constituent of fossil fuels such as oil and coal, and combustion and processing of fossil fuels appears to be the primary anthropogenic source to the aquatic environment. Anthracene is a linear three ring structure with a molecular weight of 178.2 and reported K<sub>ow</sub>s that range from 4.15 to 4.67. Aqueous solubility is relatively low (30-80 ug/L (CCREM 1987)) and suggests that the primary fate of anthracene will be partitioning to organic matter and deposition in

sediments.

Measured bioconcentration factors (Smith *et al.* 1988) for fish ranged from 912 to 917 while MacKay *et al.* (1992) reported bioconcentration factors that ranged from log 2.21 to log 4.22 (162 to 16,596). Thus, anthracene could be bioaccumulated by certain organisms to high concentrations.

## ii. Sediment Guidelines

### No-Effect Level

No PWQOs/Gs were available to calculate a No-Effect Level for anthracene.

### Lowest Effect Level

The Lowest Effect Level for anthracene was calculated as the 5th percentile of the Species Screening Level Concentrations (SSLCs). Each SSLC is the calculated 90th percentile of the concentration distribution for that species. The Screening Level Concentration (SLC) is a plot of the concentration distribution of all the SSLCs for that compound, and for anthracene was calculated on the basis of sediment concentrations from 254 locations in and adjacent to the Great Lakes region. The bulk sediment concentrations ranged from 0.01  $\mu\text{g/g}$  to 215  $\mu\text{g/g}$  (0.017  $\mu\text{g/g}$  organic carbon to 2443  $\mu\text{g/g}$  organic carbon). Sediment concentrations were normalized to the actual sediment organic carbon content (as denoted by TOC) before calculations were undertaken. Species Screening Level Concentrations were calculated for 72 species. The actual species used in the calculation, the concentration mean and range, and the 90th percentile of the Species Screening Level Concentration (SSLC) for each species are presented in Table 1. A detailed plot of the SLC is provided in Figure 1.

The 5th percentile of the organic carbon-normalized SLC, converted to a bulk sediment concentration assuming a limit of 1% sediment TOC concentration, is calculated as 0.220  $\mu\text{g/g}$ .

### Severe Effect Level

The Severe Effect Level has been calculated as the 95th percentile of the organic-carbon normalized Species Screening Level Concentration distribution. The data used are the same as for the Lowest Effect Level Guideline, which are presented in Table 1. Figure 1 also shows the 95th percentile of the Species SLC distribution.

The 95th percentile of the organic-carbon normalized SLC plot is calculated as 369  $\mu\text{g/g}$  of organic carbon, which is rounded to 370  $\mu\text{g/g}$  of organic carbon. To arrive at the bulk sediment Severe Effect Level guideline, this value is multiplied by the actual TOC content of the sediments to which the guideline is being applied. For example, a sediment TOC content of 5% results in a bulk sediment guideline of 370  $\mu\text{g/g}$  O.C.  $\times$  0.05 or 18.5  $\mu\text{g/g}$ .

## **Benz[a]anthracene**

### i. Aquatic Fate

Benz[a]anthracene has been noted as a common constituent of coal tar. It is a four ring structure with a molecular weight of 228.3 and reported partition coefficients ranging from 5.49 to 5.91 (Mackay *et al.* 1992). Solubility in water is low and benz[a]anthracene would be expected to partition to organic matter in the aquatic environment.

Measured bioconcentration factors range from log 2.54 to log 4.56 (347 to 36,308) (Mackay *et al.* 1992), suggesting potential for bioaccumulation by some aquatic organisms.

### ii. Sediment Guidelines

#### No-Effect Level

No PWQOs/Gs were available to calculate a No-Effect Level for benz[a]anthracene.

#### Lowest Effect Level

The Lowest Effect Level for

benz[a]anthracene was calculated as the 5th percentile of the Species Screening Level Concentrations (SSLCs). Each SSLC is the calculated 90th percentile of the concentration distribution for that species. The Screening Level Concentration (SLC) is a plot of the concentration distribution of all the SSLCs for that compound, and for benz[a]anthracene was calculated on the basis of sediment concentrations from 241 locations in and adjacent to the Great Lakes region. The sediment concentrations ranged from 0.02 µg/g to 88 µg/g (0.016 ug/g organic carbon to 1800 ug/g organic carbon). Sediment concentrations were normalized to the actual sediment organic carbon content (as denoted by TOC) before calculations were undertaken. Species Screening Level Concentrations were calculated for 71 species. The actual species used in the calculation, the concentration mean and range, and the 90th percentile of the Species Screening Level Concentration (SSLC) are presented in Table 2. A detailed plot of the SLC is provided in Figure 2.

The 5th percentile of the organic-carbon normalized SLC, converted to a bulk sediment concentration assuming a limit of 1% sediment TOC concentration, is calculated as 0.320 µg/g.

#### Severe Effect Level

The Severe Effect Level has been calculated as the 95th percentile of the organic-carbon normalized Species Screening Level concentration distribution. The data used are the same as for the Lowest Effect Level Guideline, which are presented in Table 2. Figure 2 also shows the 95th percentile of the Species SLC distribution.

The 95th percentile of the organic-carbon normalized SLC plot is calculated as 1,475 µg/g of organic carbon which is rounded to 1,480 µg/g of organic carbon. To arrive at the bulk sediment Severe Effect Level guideline, this value is multiplied by the actual TOC content of the sediments to which the guideline is being applied.

### Benzo[k]fluoranthene

The primary source of benzo[k]fluoranthene to the aquatic environment is from processing and combustion of fossil fuels. Benzo[k]fluoranthene is a common constituent of coal tar.

Benzo[k]fluoranthene is a five ring, high molecular weight (252.3) compound. Aqueous solubility is low (0.8 to 8.1 ug/L) and reported log K<sub>ow</sub> range from 6.06 to 7.20 (Mackay *et al.* 1992). In aquatic systems it is expected to rapidly partition to organic matter. Bioconcentration factors range from log 0.255 to log 5.15 (1.8 to 141,253) (Mackay *et al.* 1992) and indicate that accumulation in organism tissues could be a major fate process.

#### ii Sediment Guidelines

##### No-Effect Level

No PWQOs/Gs were available to calculate a No-Effect Level for benzo[k]fluoranthene.

##### Lowest Effect Level

The Lowest Effect Level for benzo[k]fluoranthene was calculated as the 5th percentile of the Species Screening Level Concentrations (SSLCs). Each SSLC is the calculated 90th percentile of the concentration distribution for that species. The Screening Level Concentration (SLC) is a plot of the concentration distribution of all the SSLCs for that compound, and for benzo[k]fluoranthene was calculated on the basis of sediment concentrations from 193 locations in and adjacent to the Great Lakes region. The sediment concentrations ranged from 0.02 µg/g to 67 µg/g (0.20 ug/g organic carbon to 3045 ug/g organic carbon). Sediment concentrations were normalized to the actual sediment organic carbon content (as denoted by TOC) before calculations were undertaken. Species Screening Level Concentrations were calculated for 66 species. The actual species used in the calculation, the concentration mean and range, and the 90th percentile of the Species Screening Level Concentration (SSLC) are presented in Table 3. A detailed plot of the SLC is provided in Figure 3.

The 5th percentile of the organic carbon-

#### i Aquatic Fate



normalized SLC, converted to a bulk sediment concentration assuming a limit of 1% sediment TOC concentration, is calculated as 0.240  $\mu\text{g/g}$ .

#### Severe Effect Level

The Severe Effect Level has been calculated as the 95th percentile of the organic carbon-normalized Species Screening Level concentration distribution. The data used are the same as for the Lowest Effect Level Guideline which are presented in Table 3. Figure 3 also shows the 95th percentile of the Species SLC distribution.

The Severe Effect Level is based on the 95th percentile of the organic carbon-normalized SLC plot, which was calculated as 1,341  $\mu\text{g/g}$  of organic carbon which is rounded to 1,340  $\mu\text{g/g}$  of organic carbon. To arrive at the bulk sediment Severe Effect Level guideline this value is multiplied by the actual TOC content of the sediments to which the guideline is being applied.

### Benzo[a]pyrene

#### i Aquatic Fate

Benzo[a]pyrene is a 5 ring, high molecular weight compound (252.3) of low aqueous solubility (0.5 to 6.9  $\mu\text{g/L}$ ) (Mackay *et al.* 1992) and reported log kows ranging from 4.05 to 8.5. Both CCREM (1987) and Smith *et al.* (1988) report log Kows of 6.04 for benzo[a]pyrene. Thus, it is expected that benzo[a]pyrene will rapidly partition to organic matter in the aquatic environment. Benzo[a]pyrene has been identified as comprising 1% by weight of total PAH in coal tar creosote (Mueller *et al.* 1989).

Smith *et al.* (1988) reported bioconcentration factors that ranged from 22 in fish to 3,000 in snails, while Mackay *et al.* (1992) report bioconcentration factors ranging from log 1.1 to log 6.95 (12.6 to 8,912,509). Thus, depending on the organism, benzo[a]pyrene could be accumulated in organism tissues to very high levels.

#### ii Sediment Guidelines

##### No-Effect Level

No PWOOs/Gs were available to calculate a No-Effect Level for benzo[a]pyrene.

##### Lowest Effect Level

The Lowest Effect Level for benzo[a]pyrene was calculated as the 5th percentile of the Species Screening Level Concentrations (SSLCs). Each SSLC is the calculated 90th percentile of the concentration distribution for that species. The Screening Level Concentration (SLC) is a plot of the concentration distribution of all the SSLCs for that compound, and for benzo[a]pyrene was calculated on the basis of sediment concentrations from 258 locations in and adjacent to the Great Lakes region. The sediment concentrations ranged from 0.02  $\mu\text{g/g}$  to 54  $\mu\text{g/g}$  (0.02  $\mu\text{g/g}$  organic carbon to 2,181  $\mu\text{g/g}$  organic carbon). Sediment concentrations were normalized to the actual sediment organic carbon content (as denoted by TOC) before calculations were undertaken. Species Screening Level Concentrations were calculated for 76 species. The actual species used in the calculation, the concentration mean and range, and the 90th percentile of the Species Screening Level Concentration (SSLC) are presented in Table 4. A detailed plot of the SLC is provided in Figure 4.

The 5th percentile of the organic carbon-normalized SLC, converted to a bulk sediment concentration assuming a limit of 1% sediment TOC concentration, is calculated as 0.370  $\mu\text{g/g}$ .

##### Severe Effect Level

The Severe Effect Level has been calculated as the 95th percentile of the organic carbon-normalized Species Screening Level Concentration distribution. The data used are the same as for the Lowest Effect Level Guideline which are presented in Table 4. Figure 4 also shows the 95th percentile of the Species SLC distribution.

The Severe Effect Level is based on the 95th percentile of the organic carbon-normalized SLC plot, which was calculated as 1,443  $\mu\text{g/g}$  of organic carbon which is rounded to 1,440  $\mu\text{g/g}$  of organic carbon. To arrive at the bulk sediment Severe Effect Level guideline this value is multiplied by the actual TOC content of the sediments to which the guideline is being applied.

## Benzo[g,h,i]perylene

### i Aquatic Fate

Benzo[g,h,i]perylene is a six ring, high molecular weight (276.3) compound. The usual fate in water would be rapid partitioning to organic matter as determined by the low aqueous solubility, which ranges from 0.22 to 0.83  $\mu\text{g/L}$ , and the high partition coefficient (log K<sub>ow</sub>s range from 6.51 to 7.6) (Mackay *et al.* 1992)

Mackay *et al.* (1992) report bioconcentration factors of log 4.45 and log 5.54 (28,184 and 34,674) in invertebrates and benzo[g,h,i]perylene would appear to be highly bioaccumulable in certain organisms.

### ii Sediment Guidelines

#### No-Effect Level

No PWQOs/Gs were available to calculate a No-Effect Level for benzo[g,h,i]perylene.

#### Lowest Effect Level

The Lowest Effect Level for benzo[g,h,i]perylene was calculated as the 5th percentile of the Species Screening Level Concentrations (SSLCs). Each SSLC is the calculated 90th percentile of the concentration distribution for that species. The Screening Level Concentration (SLC) is a plot of the concentration distribution of all the SSLCs for that compound, and for benzo[g,h,i]perylene was calculated on the basis of sediment concentrations from 246 locations in and adjacent to the Great Lakes region. The sediment concentrations ranged from 0.02  $\mu\text{g/g}$  to 31  $\mu\text{g/g}$  (0.02  $\mu\text{g/g}$  organic carbon to 350  $\mu\text{g/g}$  organic carbon). Sediment concentrations were normalized to the actual sediment organic carbon content (as denoted by TOC) before calculations were undertaken. Species Screening Level Concentrations were calculated for 72 species. The actual species used in the calculation, the concentration mean and range, and the 90th percentile of the Species Screening Level

Concentration (SSLC) are presented in Table 5. A detailed plot of the SLC is provided in Figure 5.

The 5th percentile of the organic carbon-normalized SLC, converted to a bulk sediment concentration assuming a limit of 1% sediment TOC concentration, is calculated as 0.170  $\mu\text{g/g}$ .

#### Severe Effect Level

The Severe Effect Level has been calculated as the 95th percentile of the organic carbon-normalized Species Screening Level concentration distribution. The data used are the same as for the Lowest Effect Level Guideline which are presented in Table 5. Figure 5 also shows the 95th percentile of the Species SLC distribution.

The Severe Effect Level is based on the 95th percentile of the organic carbon-normalized SLC plot, which was calculated as 322  $\mu\text{g/g}$ . This was rounded to 320  $\mu\text{g/g}$  of organic carbon. To arrive at the bulk sediment Severe Effect Level guideline this value is multiplied by the actual TOC content of the sediments to which the guideline is being applied.

## Chrysene

### i Aquatic Fate

Chrysene is a typical constituent of coal tar, comprising approximately 3% by weight of total PAH (Mueller *et al.* 1989). Chrysene is a four ring structure of relatively high molecular weight (228.3) and low solubility (1.5 to 17  $\mu\text{g/L}$  (Mackay *et al.* 1992)). Based on relatively high partition coefficients (log K<sub>ow</sub>s ranged from 5.01 to 7.1 (Mackay *et al.* (1992); 5.61 Smith *et al.* 1988)) chrysene would be expected to partition rapidly in aquatic systems to organic matter.

Bioconcentration factors reported by Mackay *et al.* (1992) ranged from log 0.792 to log 4.72 (6.19 to 52,481) and suggest that chrysene could accumulate to high concentrations in certain organisms.

### ii Sediment Guidelines

## No-Effect Level

Since no PWQOs exist for chrysene a No-Effect Level could not be calculated.

## Lowest Effect Level

The Lowest Effect Level for chrysene was calculated as the 5th percentile of the Species Screening Level Concentrations (SSLCs). Each SSLC is the calculated 90th percentile of the concentration distribution for that species. The Screening Level Concentration (SLC) is a plot of the concentration distribution of all the SSLCs for that compound, and for chrysene was calculated on the basis of sediment concentrations from 255 locations in and adjacent to the Great Lakes region. The sediment concentrations ranged from 0.02  $\mu\text{g/g}$  to 95  $\mu\text{g/g}$  (0.02  $\text{ug/g}$  organic carbon to 863  $\text{ug/g}$  organic carbon). Sediment concentrations were normalized to the actual sediment organic carbon content (as denoted by TOC) before calculations were undertaken. Species Screening Level Concentrations were calculated for 71 species. The actual species used in the calculation, the concentration mean and range, and the 90th percentile of the Species Screening Level Concentration (SSLC) are presented in Table 6. A detailed plot of the SLC is provided in Figure 6.

The 5th percentile of the organic carbon-normalized SLC, converted to a bulk sediment concentration assuming a limit of 1% sediment TOC concentration, is calculated as 0.340  $\mu\text{g/g}$ .

## Severe Effect Level

The Severe Effect Level has been calculated as the 95th percentile of the organic carbon-normalized Species Screening Level concentration distribution. The data used are the same as for the Lowest Effect Level Guideline which are presented in Table 6. Figure 6 also shows the 95th percentile of the Species SLC distribution.

The Severe Effect Level is based on the 95th percentile of the organic carbon-normalized SLC plot, which was calculated as 463  $\mu\text{g/g}$  of organic carbon which is rounded to 460  $\mu\text{g/g}$  of organic carbon. To arrive at the bulk sediment Severe Effect Level guideline this value is multiplied by the actual TOC content of the sediments to

which the guideline is being applied. Since the sediment concentrations used in the calculations did not span a wide concentration range, these values must be considered as conservative.

## Dibenzo[a,h]anthracene

### i Aquatic Fate

Dibenzo[a,h]anthracene is a five ring structure of high molecular weight (278.4). High partition coefficients (log K<sub>ow</sub>s range from 5.80 to 7.19 (Mackay *et al.* 1992); 5.97 (CCREM 1987)) suggest the major aquatic fate would be partitioning to organic matter.

Bioconcentration factors as reported by Mackay *et al.* (1992) range from log 1.0 in fish to log 5.84 in invertebrates (10 to 691,830 respectively) and suggest that there is high potential for bioaccumulation in certain organisms.

### ii Sediment Guidelines

#### No-Effect Level

No PWQOs/Gs were available to calculate a No-Effect Level for dibenzo[a,h]anthracene.

#### Lowest Effect Level

The Lowest Effect Level for dibenzo[a,h]anthracene was calculated as the 5th percentile of the Species Screening Level Concentrations (SSLCs). Each SSLC is the calculated 90th percentile of the concentration distribution for that species. The Screening Level Concentration (SLC) is a plot of the concentration distribution of all the SSLCs for that compound, and for dibenzo[a,h]anthracene was calculated on the basis of sediment concentrations from 231 locations in and adjacent to the Great Lakes region. The sediment concentrations ranged from 0.02  $\mu\text{g/g}$  to 6.7  $\mu\text{g/g}$  (0.02  $\text{ug/g}$  organic carbon to 150  $\text{ug/g}$  organic carbon). Sediment concentrations were normalized to the actual sediment organic carbon content (as denoted by TOC) before calculations were undertaken. Species Screening Level

Concentrations were calculated for 68 species. The actual species used in the calculation, the concentration mean and range, and the 90th percentile of the Species Screening Level Concentration (SSLC) are presented in Table 7. A detailed plot of the SLC is provided in Figure 7.

The 5th percentile of the organic carbon-normalized SLC, converted to a bulk sediment concentration assuming a limit of 1% sediment TOC concentration, is calculated as 0.060  $\mu\text{g/g}$ .

#### Severe Effect Level

The Severe Effect Level has been calculated as the 95th percentile of the organic carbon-normalized Species Screening Level concentration distribution. The data used are the same as for the Lowest Effect Level Guideline which are presented in Table 7. Figure 7 also shows the 95th percentile of the Species SLC distribution.

The Severe Effect Level is based on the 95th percentile of the organic carbon-normalized SLC plot, which was calculated as 125  $\mu\text{g/g}$  of organic carbon. This value is rounded to 130  $\mu\text{g/g}$  of organic carbon. To arrive at the bulk sediment Severe Effect Level guideline, this value is multiplied by the actual TOC content of the sediments to which the guideline is being applied.

Due to the limited concentration range sampled this value should be regarded as conservative.

### Fluoranthene

#### i Aquatic Fate

Fluoranthene typically comprises approximately 4% by weight of PAH in coal tar creosote (Mueller *et al.* 1989). It is a four ring structure of relatively high molecular weight and an aqueous solubility ranging from 190 to 1,430  $\mu\text{g/L}$ . Reported log Kows range from 4.70 to 6.5 (Mackay *et al.* 1992) while CCREM (1987) report a log Kow of 5.33 and suggest the fate of fluoranthene in aquatic systems would be partitioning to organic matter.

Bioconcentration factors for invertebrates range from log 0.756 to log 4.9 (5.7 to 79,433) (Mackay *et al.* 1992) and indicate that bioaccumulation can be a major concern.

#### ii Sediment Guidelines

##### No-Effect Level

No PWQOs/Gs were available to calculate a No-Effect Level for fluoranthene.

##### Lowest Effect Level

The Lowest Effect Level for fluoranthene was calculated as the 5th percentile of the Species Screening Level Concentrations (SSLCs). Each SSLC is the calculated 90th percentile of the concentration distribution for that species. The Screening Level Concentration (SLC) is a plot of the concentration distribution of all the SSLCs for that compound, and for fluoranthene was calculated on the basis of sediment concentrations from 235 locations in and adjacent to the Great Lakes region. The sediment concentrations ranged from 0.02  $\mu\text{g/g}$  to 395  $\mu\text{g/g}$  (0.06  $\mu\text{g/g}$  organic carbon to 3,292  $\mu\text{g/g}$  organic carbon). Sediment concentrations were normalized to the actual sediment organic carbon content (as denoted by TOC) before calculations were undertaken. Species Screening Level Concentrations were calculated for 70 species. The actual species used in the calculation, the concentration mean and range, and the 90th percentile of the Species Screening Level Concentration (SSLC) are presented in Table 8. A detailed plot of the SLC is provided in Figure 8.

The 5th percentile of the organic carbon-normalized SLC, converted to a bulk sediment concentration assuming a limit of 1% sediment TOC concentration, is calculated as 0.750  $\mu\text{g/g}$ .

##### Severe Effect Level

The Severe Effect Level has been calculated as the 95th percentile of the organic carbon-normalized Species Screening Level concentration distribution. The data used are the same as for the Lowest Effect Level Guideline

which are presented in Table 8. Figure 8 also shows the 95th percentile of the Species SLC distribution.

The Severe Effect Level is based on the 95th percentile of the organic carbon-normalized SLC plot, which was calculated as 1020  $\mu\text{g/g}$  of organic carbon. To arrive at the bulk sediment Severe Effect Level guideline this value is multiplied by the actual TOC content of the sediments to which the guideline is being applied.

## Fluorene

### i Aquatic Fate

Fluorene is a major constituent of fossil fuels and has been found to comprise 8% by weight of total PAH in coal tar creosote (Mueller *et al.* 1989). It is a three ring structure of low molecular weight (166.2) and relatively high aqueous solubility (range from 1,230 to 10,980  $\mu\text{g/L}$  (Mackay *et al.* 1992)). Reported partition coefficients (Kow) range from log 3.91 to log 4.47 and suggest that partitioning to organic matter would be a concern.

Bioconcentration factors range from log 2.62 to log 3.67 (417 to 4,677) suggesting that there is potential for accumulation in organism tissues.

### ii Sediment Guidelines

#### No-Effect Level

No PQOQs/Gs were available to calculate a No-Effect Level for fluorene.

#### Lowest Effect Level

The Lowest Effect Level for fluorene was calculated as the 5th percentile of the Species Screening Level Concentrations (SSLCs). Each SSLC is the calculated 90th percentile of the concentration distribution for that species. The Screening Level Concentration (SLC) is a plot of the concentration distribution of all the SSLCs for that compound, and for fluorene was calculated on the basis of sediment concentrations from 223

locations in and adjacent to the Great Lakes region. The sediment concentrations ranged from 0.02  $\mu\text{g/g}$  to 45.5  $\mu\text{g/g}$  (0.02  $\mu\text{g/g}$  organic carbon to 378  $\mu\text{g/g}$  organic carbon). Sediment concentrations were normalized to the actual sediment organic carbon content (as denoted by TOC) before calculations were undertaken. Species Screening Level Concentrations were calculated for 66 species. The actual species used in the calculation, the concentration mean and range, and the 90th percentile of the Species Screening Level Concentration (SSLC) are presented in Table 9. A detailed plot of the SLC is provided in Figure 9.

The 5th percentile of the organic carbon-normalized SLC, converted to a bulk sediment concentration assuming a limit of 1% sediment TOC concentration, is calculated as 0.190  $\mu\text{g/g}$ .

#### Severe Effect Level

The Severe Effect Level has been calculated as the 95th percentile of the organic carbon-normalized Species Screening Level concentration distribution. The data used are the same as for the Lowest Effect Level Guideline which are presented in Table 9. Figure 9 also shows the 95th percentile of the Species SLC distribution.

The Severe Effect Level is based on the 95th percentile of the organic carbon-normalized SLC plot, which was calculated as 157  $\mu\text{g/g}$  of organic carbon which is rounded to 160  $\mu\text{g/g}$  organic carbon. To arrive at the bulk sediment Severe Effect Level guideline this value is multiplied by the actual TOC content of the sediments to which the guideline is being applied.

## Indeno[1,2,3-cd]pyrene

### i Aquatic Fate

Indeno[1,2,3-cd]pyrene is a six ring, high molecular weight (276.3) compound. Solubility has been reported as 78  $\mu\text{g/L}$  (CCME 1989) while CCREM reports a partition coefficient (Kow) of log 7.66. Thus, the fate of indeno[1,2,3-cd]pyrene in water appears to be rapid partitioning to organic matter.



Based on the low solubility and high partition coefficient, indeno[1,2,3-cd]pyrene would be expected to accumulate in the tissues of certain organisms.

## ii Sediment Guidelines

### No-Effect Level

No PWQOs/Gs were available to calculate a No-Effect Level for indeno[1,2,3-cd]pyrene.

### Lowest Effect Level

The Lowest Effect Level for indeno[1,2,3-cd]pyrene was calculated as the 10th percentile of the Species Screening Level Concentrations (SSLCs). Each SSLC is the calculated 90th percentile of the concentration distribution for that species. The Screening Level Concentration (SLC) is a plot of the concentration distribution of all the SSLCs for that compound, and for indeno[1,2,3-cd]pyrene was calculated on the basis of sediment concentrations from 254 locations in and adjacent to the Great Lakes region. The sediment concentrations were normalized to 0.02 µg/g to 31 µg/g (0.05 ug/g organic carbon to 478 ug/g organic carbon). Sediment concentrations were normalized to the actual sediment organic carbon content (as denoted by TOC) before calculations were undertaken. Species Screening Level Concentrations were calculated for 72 species. The actual species used in the calculation, the concentration mean and range, and the 90th percentile of the Species Screening Level Concentration (SSLC) are presented in Table 10. A detailed plot of the SLC is provided in Figure 10.

The 5th percentile of the organic carbon-normalized SLC, converted to a bulk sediment concentration assuming a limit of 1% sediment TOC concentration, is calculated as 0.200 µg/g.

### Severe Effect Level

The Severe Effect Level has been calculated as the 95th percentile of the organic carbon-normalized Species Screening Level concentration distribution. The data used are the same as for the Lowest Effect Level Guideline

which are presented in Table 10. Figure 10 also shows the 95th percentile of the Species SLC distribution.

The Severe Effect Level is based on the 95th percentile of the organic carbon-normalized SLC plot, which was calculated as 320 µg/g of organic carbon and this number is not rounded. To arrive at the bulk sediment Severe Effect Level guideline this value is multiplied by the actual TOC content of the sediments to which the guideline is being applied.

## **Phenanthrene**

## i Aquatic Fate

Phenanthrene has been identified as a major constituent of coal tar creosote, comprising 13% by weight of total PAH (Mueller *et al.* 1989). It is a three ring structure of relatively low molecular weight (178.2) and moderate aqueous solubility (45 to 11,250 ug/L (Mackay *et al.* 1992)). Reported log kows range from 3.60 to 5.92 (Mackay *et al.* 1992) while CCREM (1988) reports a log Kow of 4.46. Therefore, phenanthrene would be expected to partition to organic matter and accumulate in sediments.

Bioconcentration factors reported by Mackay *et al.* (1992) range from log 0.756 to log 4.57 (5.7 to 37,153) and indicate that bioaccumulation could be a concern with some organisms.

## ii Sediment Guidelines

### No-Effect Level

Since no PWQOs exist for phenanthrene a No-Effect Level could not be calculated.

### Lowest Effect Level

The Lowest Effect Level for phenanthrene was calculated as the 5th percentile of the Species Screening Level Concentrations (SSLCs). Each SSLC is the calculated 90th percentile of the

concentration distribution for that species. The Screening Level Concentration (SLC) is a plot of the concentration distribution of all the SSLCs for that compound, and for phenanthrene was calculated on the basis of sediment concentrations from 256 locations in and adjacent to the Great Lakes region. The sediment concentrations ranged from 0.02 µg/g to 306.6 µg/g (0.02 ug/g organic carbon to 2,695 ug/g organic carbon). Sediment concentrations were normalized to the actual sediment organic carbon content (as denoted by TOC) before calculations were undertaken. Species Screening Level Concentrations were calculated for 73 species. The actual species used in the calculation, the concentration mean and range, and the 90th percentile of the Species Screening Level Concentration (SSLC) are presented in Table 11. A detailed plot of the SLC is provided in Figure 11.

The 5th percentile of the organic carbon-normalized SLC, converted to a bulk sediment concentration assuming a limit of 1% sediment TOC concentration, is calculated as 0.560 µg/g.

#### Severe Effect Level

The Severe Effect Level has been calculated as the 95th percentile of the organic carbon-normalized Species Screening Level concentration distribution. The data used are the same as for the Lowest Effect Level Guideline which are presented in Table 11. Figure 11 also shows the 95th percentile of the Species SLC distribution.

The Severe Effect Level is based on the 95th percentile of the organic carbon-normalized SLC plot, which was calculated as 954 µg/g of organic carbon which is rounded to 950 µg/g of organic carbon. To arrive at the bulk sediment Severe Effect Level guideline this value is multiplied by the actual TOC content of the sediments to which the guideline is being applied.

### Pyrene

#### i Aquatic Fate

Pyrene is a four ring structure with a

molecular weight of 202.3. Solubility is relatively low and ranges from 32 to 1,560 ug/L (Mackay *et al.* 1992). Partition coefficients (log Kow) range from 4.88 to 6.7 and suggest that the principal fate would be partitioning to organic matter.

Bioconcentration factors reported by Mackay *et al.* (1992) range from log 0.716 to log 4.65 (5.2 to 44,668) and suggest that for some organisms bioaccumulation may be an important fate.

#### ii Sediment Guidelines

##### No-Effect Level

Since no PWQOs exist for phenanthrene a No-Effect Level could not be calculated.

##### Lowest Effect Level

The Lowest Effect Level for pyrene was calculated as the 5th percentile of the Species Screening Level Concentrations (SSLCs). Each SSLC is the calculated 90th percentile of the concentration distribution for that species. The Screening Level Concentration (SLC) is a plot of the concentration distribution of all the SSLCs for that compound, and for pyrene was calculated on the basis of sediment concentrations from 260 locations in and adjacent to the Great Lakes region. The sediment concentrations ranged from 0.02 µg/g to 295 µg/g (0.01 ug/g organic carbon to 2,458 ug/g organic carbon). Sediment concentrations were normalized to the actual sediment organic carbon content (as denoted by TOC) before calculations were undertaken. Species Screening Level Concentrations were calculated for 73 species. The actual species used in the calculation, the concentration mean and range, and the 90th percentile of the Species Screening Level Concentration (SSLC) are presented in Table 12. A detailed plot of the SLC is provided in Figure 12.

The 5th percentile of the organic carbon-normalized SLC, converted to a bulk sediment concentration assuming a limit of 1% sediment TOC concentration, is calculated as 0.490 µg/g.

## Severe Effect Level

The Severe Effect Level has been calculated as the 95th percentile of the organic carbon-normalized Species Screening Level concentration distribution. The data used are the same as for the Lowest Effect Level Guideline which are presented in Table 12. Figure 12 also shows the 95th percentile of the Species SLC distribution.

The Severe Effect Level is based on the 95th percentile of the organic carbon-normalized SLC plot, which was calculated as 845  $\mu\text{g/g}$  of organic carbon which is rounded to 850  $\mu\text{g/g}$  of organic carbon. To arrive at the bulk sediment Severe Effect Level guideline this value is multiplied by the actual TOC content of the sediments to which the guideline is being applied.

## Total PAH

### i Aquatic Fate

As noted earlier, most PAH compounds would be expected to partition to organic matter and accumulate in sediments.

### ii Sediment Guidelines

Sediment guidelines for total PAH are based on the sum of 16 PAH compounds: acenaphthene, acenaphthylene, anthracene, benz[a]anthracene, benzo[k]fluoranthene, benzo[b]fluorene, benzo[a]pyrene, benzo[g,h,i]perylene, chrysene, dibenzo[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, naphthalene, phenanthrene and pyrene.

## No-Effect Level

Since no PWQOs exist for total PAH a No-Effect Level could not be calculated.

## Lowest Effect Level

The Lowest Effect Level for total PAH was

calculated as the 5th percentile of the Species Screening Level Concentrations (SSLCs). Each SSLC is the calculated 90th percentile of the concentration distribution for that species. The Screening Level Concentration (SLC) is a plot of the concentration distribution of all the SSLCs for that compound, and for total PAH was calculated on the basis of sediment concentrations from 288 locations in and adjacent to the Great Lakes region. The sediment concentrations ranged from 0.02  $\mu\text{g/g}$  to 1,496  $\mu\text{g/g}$  (0.01  $\mu\text{g/g}$  organic carbon to 15,181  $\mu\text{g/g}$  organic carbon). Sediment concentrations were normalized to the actual sediment organic carbon content (as denoted by TOC) before calculations were undertaken. Species Screening Level Concentrations were calculated for 73 species. The actual species used in the calculation, the concentration mean and range, and the 90th percentile of the Species Screening Level Concentration (SSLC) are presented in Table 13. A detailed plot of the SLC is provided in Figure 132.

The 5th percentile of the organic carbon-normalized SLC, converted to a bulk sediment concentration assuming a limit of 1% sediment TOC concentration, is calculated as 3.7  $\mu\text{g/g}$  which is rounded to 4.0  $\mu\text{g/g}$ .

## Severe Effect Level

The Severe Effect Level has been calculated as the 95th percentile of the organic carbon-normalized Species Screening Level concentration distribution. The data used are the same as for the Lowest Effect Level Guideline which are presented in Table 13. Figure 13 also shows the 95th percentile of the Species SLC distribution.

The Severe Effect Level is based on the 95th percentile of the organic carbon-normalized SLC plot, which was calculated as 10,262  $\mu\text{g/g}$  of organic carbon which is rounded to 10,000  $\mu\text{g/g}$  of organic carbon. To arrive at the bulk sediment Severe Effect Level guideline this value is multiplied by the actual TOC content of the sediments to which the guideline is being applied.

## RESEARCH NEEDS

Limitations of the data have precluded the use of some of the methods in calculating the guidelines. In all cases either  $K_{ow}$  values, or PWQOs/Gs were not available for calculation of No-Effect Levels. In addition, the SLC method described in the Protocol requires that the full tolerance range for each species be sampled and that the data for the species is not biased towards lightly or heavily contaminated areas. It has not been possible in all cases to satisfy these requirements. In particular, concentration ranges for acenaphthene, acenaphthylene, benzo(b)fluorene and naphthalene were too narrow to permit calculation of sediment quality guidelines for these compounds at this time. These will be added in the future when sufficient data is available.

This points to the necessity for future effort to be directed towards incorporating additional data, particularly data from highly contaminated sites. There is also a need to concentrate efforts towards sediment bioassay procedures to verify the results of the SLC process.

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## APPENDIX I - TABLES

### Species Screening Level Calculations

#### Explanation of Abbreviations:

- N= - Number of observations used for the calculation of the SSLC.
- Minimum - Minimum concentration (dry weight and organic carbon normalized) at sites at which the species was present.
- Maximum - Maximum concentration (dry weight and organic carbon normalized) at sites at which the species was present.
- Insufficient number of observations to calculate percentiles.

Table 1: Anthracene - Species Screening Level Concentration (ug/g organic carbon)

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
1	Ablabesmyia sp	23	1.071	454.5	178.02
2	Aelosoma sp	0	-	-	-
3	Amnicola limosa	71	0.030	454.5	58.79
4	Asellus sp	61	0.020	454.5	60.40
5	Aulodrilus limnobius	5	7.059	28.0	.
6	Aulodrilus pigueti	21	1.304	260.7	167.21
7	Aulodrilus pleurisetia	36	0.417	54.0	31.63
8	Bithynia tentaculata	3	4.118	19.1	.
9	Branchiura sowerbyi	12	3.333	60.0	53.36
10	Caenis sp	20	0.417	146.9	57.65
11	Ceraclea sp	18	3.261	146.9	103.36
12	Chaetogaster diaphanus	3	5.455	54.0	.
13	Cheumatopsyche sp	27	0.017	260.7	159.33
14	Chironomus sp	71	0.023	648.5	39.57
15	Cladopelma sp	9	0.833	53.9	.
16	Cladotanytarsus sp	10	0.417	155.2	144.06
17	Coelotanytus sp	19	0.023	60.0	55.00
18	Cricotopus sp	30	0.455	454.5	154.44
19	Tribelos sp.	23	0.417	36.5	27.98
20	Cryptochironomus sp	89	0.020	454.5	53.96
21	Dicrotendipes sp	32	0.020	193.3	41.74
22	Eukiefferiella sp	1	736.364	736.4	.
23	Gammarus fasciatus	80	0.023	341.8	62.70
24	Glossiphonia heteroclita	5	0.769	341.8	.
25	Glossosoma sp	0	-	-	-
26	Glyptotendipes sp	15	0.030	19.1	14.07
27	Gyraulus parvus	25	0.400	155.2	56.38
28	Helisoma anceps	9	0.083	155.2	.
29	Heterotrissocladius sp	0	-	-	-
30	Hyalella azteca	30	0.020	155.2	.
31	Hydropsyche sp	31	0.769	454.5	196.54
32	Hydroptila sp	5	5.455	155.2	.
33	Ilyodrilus templetoni	46	0.500	2443.2	125.74
34	Limnodrilus hoffmeisteri	186	0.017	2443.2	54.27
35	Limnodrilus sp	30	0.400	2443.2	245.48
36	Limnodrilus udekemianus	69	0.159	500.0	116.67
37	Lumbriculus variegatus	12	0.244	454.5	333.18
38	Manayunkia speciosa	27	1.327	454.5	219.30
39	Microtendipes sp	4	2.150	15.9	.
40	Mystacides sp	3	6.143	15.5	.
41	Nais behningi	2	9.130	29.5	.
42	Nais communis	7	0.059	454.5	.
43	Nais variabilis	21	1.327	454.5	205.81

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
44	Nanocladius sp	24	1.481	260.7	177.94
45	Neureclipsis sp	7	2.222	146.9	.
46	Oecetis sp	21	0.043	454.5	183.99
47	Parachironomus sp	27	1.481	155.2	70.10
48	Paralauterborniella sp	4	1.327	50.0	.
49	Paratendipes sp	5	1.304	454.5	.
50	Phaenopsectra sp	16	1.327	648.5	575.31
51	Phallodrilus sp	0	-	-	-
52	Physella gyrina	60	0.268	341.8	114.85
53	Piguetiella michiganensis	0	-	-	-
54	Pisidium casertanum	28	0.017	25.8	21.44
55	Pisidium compressum	1	2.151	2.2	.
56	Pisidium conventus	1	46.364	46.4	.
57	Pisidium fallax	1	0.023	0.0	.
58	Pisidium henslowanum	0	-	-	-
59	Pisidium lilljeborgi	5	0.194	4.1	.
60	Pisidium nitidum	1	5.421	5.4	.
61	Pisidium variable	1	2.800	2.8	.
62	Pleurocera acuta	0	-	-	-
63	Polypedilum scalaenum	0	-	-	-
64	Polypedilum sp	44	0.323	454.5	104.96
65	Pontoporeia hoyi	3	0.323	25.0	.
66	Potamothrix moldaviensis	42	0.268	208.9	102.08
67	Potamothrix vejvodskyi	32	1.000	208.9	57.00
68	Pristina foreli	1	5.421	5.4	.
69	Pristina osborni	0	-	-	-
70	Procladius sp	162	0.017	454.5	39.36
71	Prostoma rubrum	45	1.304	454.5	165.46
72	Pseudocloeon sp	0	-	-	-
73	Quistadrilus multisetosus	99	0.023	2443.2	78.79
74	Slavina appendiculata	13	1.327	454.5	281.90
75	Specaria josinae	2	8.182	454.5	.
76	Sphaerium nitidum	0	-	-	-
77	Sphaerium striatinum	23	0.020	260.7	164.78
78	Spirosperma ferox	68	0.036	454.5	100.33
79	Stenonema sp	2	18.824	63.0	.
80	Stictochironomus sp	10	1.304	155.2	145.96
81	Stylaria lacustris	23	1.481	208.9	109.41
82	Stylodrilus heringianus	21	1.304	260.7	205.81
83	Tanytarsus sp	36	0.020	454.5	72.08
84	Thienemannimyia sp	19	0.017	155.2	50.00
85	Tubifex sp	2	1.304	208.9	.
86	Turbellaria	0	-	-	-
87	Uncinaxis uncinata	2	6.667	28.0	.
88	Valvata sincera	33	0.020	454.5	114.69
89	Valvata tricarinata	23	0.435	193.3	92.00

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
90	Vejdovskyella intermedia	1	53.958	54.0	.
91	Elliptio complanata	1	9.444	9.4	.
92	Sphaerium simile	0	-	-	.
93	Chironomus plumosus	23	0.017	162.5	23.38
94	Cricotopus bicinctus	5	2.800	341.8	.
95	Ephemera sp	3	13.636	454.5	.
96	Helobdella stagnalis	15	0.063	341.8	169.10
97	Hexagenia limbata	15	0.400	63.0	44.90
98	Hexagenia sp	32	0.417	454.5	121.75
99	Tanytus sp	6	3.472	32.9	.
100	Tubifex tubifex	57	0.023	454.5	37.57
101	Amphicaeta americana	2	0.400	3.8	.
102	Aulodrilus americanus	31	1.304	454.5	183.99
103	Bithynia tentaculata	24	0.400	341.8	234.82
104	Caetogaster diastophus	1	44.000	44.0	.
105	Campeloma descium	9	0.417	98.5	.
106	Chaoborus punctipennis	19	0.417	24.8	24.74
107	Chironomus semireductus	1	0.036	0.0	.
108	Chironomus thummi	16	0.030	543.9	266.66
109	Crangonyx	7	3.333	260.7	.
110	Crangonyx gracilis	1	0.500	0.5	.
111	Cricotopus festivellus	4	2.941	31.8	.
112	Cricotopus sylvestris	2	2.800	341.8	.
113	Cryptotendipes	5	8.182	193.3	.
114	Demicryptochironomus	11	1.304	454.5	402.29
115	Endochironomus	29	0.030	341.8	21.54
116	Ferrissia rivularis	19	1.327	454.5	146.92
117	Gammarus	11	1.111	155.2	130.36
118	Gammarus lacustris	5	0.194	10.3	.
119	Gammarus pseudolimnaeus	3	0.030	0.6	.
120	Glossiphonia complanata	8	0.400	24.1	.
121	Harnishia	17	1.327	500.0	254.61
122	Helobdella fusca	4	2.800	12.8	.
123	Helobdella lineata	2	0.400	1.6	.
124	Isochaetides curvisetosus	2	1.327	15.5	.
125	Isochaetides freyi	8	0.030	15.5	.
126	Limnodrilus angustipenis	2	0.268	98.5	.
127	Limnodrilus cervix	68	0.159	2443.2	38.07
128	Lirceus	10	5.455	155.2	144.66
129	Monodiamesa sp/depectina	5	2.941	454.5	.
130	Nais bretcheri	7	6.977	454.5	.
131	Nais pardalis	4	9.130	454.5	.
132	Nais simplex	6	1.327	37.9	.
133	Notanypus	1	14.444	14.4	.
134	Nyctiophylax	2	0.400	2.2	.
135	Orthocladus	8	0.083	31.1	.

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
136	Oxyethira	2	24.107	50.0	.
137	Pagastiella	2	50.000	155.2	.
138	Paratanytarsus	13	0.083	193.3	125.13
139	Phylocentropus	21	0.381	78.8	21.84
140	Pisidium	81	0.023	2443.2	118.39
141	Pisidium ferrugineum	3	6.786	24.1	.
142	Pisidium ventricosum	3	0.400	341.8	.
143	Pisidium walkeri	6	0.769	341.8	.
144	Polycentropus	14	0.268	18.8	16.77
145	Potthastia	2	10.714	454.5	.
146	Potthastia longimana	1	4.050	4.1	.
147	Pristinella jenkiniae	2	1.000	11.5	.
148	Promenetus exacuus	3	0.435	21.5	.
149	Psectrocladius	11	0.194	454.5	394.67
150	Pseudochironomus	2	4.050	14.7	.
151	Pseudosmittia	2	10.833	44.0	.
152	Rheotanytarsus	8	5.455	454.5	.
153	Rhyacodrilus coccineus	1	1.327	1.3	.
154	Saetheria	0	-	-	-
155	Sialis	1	0.324	0.3	.
156	Sphaerium	23	0.036	2443.2	354.63
157	Stempellina	2	50.000	454.5	.
158	Stylaria fossularis	1	50.000	50.0	.
159	Thienemanniella	3	25.000	454.5	.
160	Trienodes	4	0.769	63.0	.
161	Vejdovskyella comata	2	8.182	454.5	.

Table 2: Benz[a]anthracene - Species Screening Level Concentration (ug/g organic carbon).

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
1	Ablabesmyia sp	23	0.276	1636.4	343.77
2	Aelosoma sp	0	-	-	-
3	Amnicola limosa	72	0.023	1800.0	119.62
4	Asellus sp	56	0.023	1800.0	181.13
5	Aulodrilus limnobius	5	31.176	93.5	.
6	Aulodrilus pigueti	21	3.913	476.4	329.09
7	Aulodrilus pleurisetia	36	1.667	124.2	96.71
8	Bithynia tentaculata	3	7.059	39.3	.
9	Branchiura sowerbyi	12	11.111	173.6	151.85
10	Caenis sp	20	0.276	475.4	80.04
11	Ceraclea sp	18	7.609	475.4	241.87
12	Chaetogaster diaphanus	3	21.818	260.0	.
13	Cheumatopsyche sp	27	0.075	475.4	394.97
14	Chironomus sp	70	0.276	1636.4	103.85
15	Cladopelma sp	9	0.833	105.0	.
16	Cladotanytarsus sp	13	0.056	260.0	213.93
17	Coelotanytus sp	17	0.078	82.0	63.20
18	Cricotopus sp	31	1.364	1800.0	421.78
19	Tribelos sp.	23	0.276	54.6	48.51
20	Cryptochironomus sp	84	0.023	1800.0	148.87
21	Dicerotendipes sp	33	0.023	476.4	90.34
22	Eukiefferiella sp	1	800	800.0	.
23	Gammarus fasciatus	76	0.078	476.4	138.99
24	Glossiphonia heteroclita	5	0.769	265.8	.
25	Glossosoma sp	0	-	-	-
26	Glyptotendipes sp	13	0.023	39.3	31.92
27	Gyraulus parvus	24	0.4	173.6	134.50
28	Helisoma anceps	9	0.4	144.8	.
29	Heterotrissocladius sp	1	1800	1800.0	.
30	Hyalella azteca	28	0.023	215.9	108.98
31	Hydropsyche sp	30	0.769	1636.4	432.99
32	Hydroptila sp	5	21.818	144.8	.
33	Ilyodrilus templetoni	46	1.684	1636.4	230.59
34	Limnodrilus hoffmeisteri	175	0.043	678.4	105.95
35	Limnodrilus sp	30	1.5	384.4	273.41
36	Limnodrilus udekemianus	69	2.963	475.4	154.12
37	Lumbriculus variegatus	12	1.22	1636.4	1176.96
38	Manayunkia speciosa	28	3.982	1800.0	592.40
39	Microtendipes sp	4	0.276	10.6	.
40	Mystacides sp	4	0.4	56.4	.
41	Nais behningi	2	31.304	51.9	.
42	Nais communis	7	0.412	1636.4	.
43	Nais variabilis	21	3.982	1636.4	468.81



Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
44	Nanocladius sp	24	5.185	475.4	411.27
45	Neureclipsis sp	7	5	475.4	.
46	Oecetis sp	20	0.769	1800.0	1520.37
47	Parachironomus sp	28	0.023	215.9	126.23
48	Paralauterborniella sp	4	3.982	105.0	.
49	Paratendipes sp	5	3.913	1636.4	.
50	Phaenopsectra sp	16	3.982	1800.0	1014.
51	Phallodrilus sp	0	-	-	-
52	Physella gyrina	58	0.435	476.4	220.92
53	Piguetiella michiganensis	0	-	-	-
54	Pisidium casertanum	24	0.023	66.9	31.17
55	Pisidium compressum	1	4.301	4.3	.
56	Pisidium conventus	1	99.242	99.2	.
57	Pisidium fallax	0	-	-	-
58	Pisidium henslowanum	0	-	-	-
59	Pisidium lilljeborgi	2	2	12.4	.
60	Pisidium nitidum	1	5.053	5.1	.
61	Pisidium variabile	1	3.08	3.1	.
62	Pleurocera acuta	0	-	-	-
63	Polypedilum scalacnum	0	-	-	-
64	Polypedilum sp	46	0.276	1636.4	119.75
65	Pontoporeia hoyi	3	1.935	55.8	.
66	Potamothrix moldaviensis	43	0.769	476.4	165.79
67	Potamothrix vejvodskyi	30	3	438.4	108.02
68	Pristina foreli	1	5.053	5.1	.
69	Pristina osborni	0	-	-	-
70	Procladius sp	151	0.023	1800.0	85.07
71	Prostoma rubrum	45	3.913	1636.4	405.83
72	Pseudocloeon sp	0	-	-	-
73	Quistadrilus multisetosus	92	0.078	476.4	194.19
74	Slavina appendiculata	13	3.982	1636.4	1011.29
75	Specaria josinae	2	25	1636.4	.
76	Sphaerium nitidum	0	-	-	-
77	Sphaerium striatinum	23	0.056	438.4	316.84
78	Spirosperma ferox	62	0.769	1636.4	246.78
79	Stenonema sp	2	44.5	109.0	.
80	Stictochironomus sp	10	3.913	144.8	141.25
81	Stylaria lacustris	23	5.185	438.4	198.98
82	Stylodrilus heringianus	21	3.913	476.4	467.99
83	Tanytarsus sp	33	0.023	1800.0	343.77
84	Thienemannimyia sp	18	0.075	144.8	108.98
85	Tubifex sp	2	3.913	438.4	.
86	Turbellaria	0	-	-	-
87	Uncinaiis uncinata	2	42	93.5	.
88	Valvata sincera	29	0.023	1800.0	476.40
89	Valvata tricarinata	24	0.345	476.4	112.66

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
90	Vejdovskyaella intermedia	1	124.167	124.2	.
91	Elliptio complanata	1	25.556	25.6	.
92	Sphaerium simile	0	-	-	.
93	Chironomus plumosus	19	0.023	225.0	69.70
94	Cricotopus bicinctus	5	3.08	265.8	.
95	Ephemera sp	3	36.364	1636.4	.
96	Helobdella stagnalis	16	0.023	265.8	166.67
97	Hexagenia limbata	13	0.769	109.0	105.86
98	Hexagenia sp	34	0.345	1800.0	310.11
99	Tanytus sp	6	9.444	72.7	.
100	Tubifex tubifex	54	0.476	1636.4	72.65
101	Amphicaeta americana	2	7.5	1800.0	.
102	Aulodrilus americanus	31	1.667	1636.4	467.99
103	Bithynia tentaculata	24	0.4	438.4	324.98
104	Caetogaster diastophus	1	260	260.0	.
105	Campeoloma descisus	11	0.345	1800.0	1483.19
106	Chaoborus punctipennis	19	1.105	66.6	31.30
107	Chironomus semireductus	0	-	-	.
108	Chironomus thummi	7	0.061	678.4	.
109	Crangonyx	7	1.667	384.1	.
110	Crangonyx gracilis	0	-	-	.
111	Cricotopus festivellus	4	10.588	69.7	.
112	Cricotopus sylvestris	2	3.08	265.8	.
113	Cryptotendipes	5	15.556	476.4	.
114	Demicyptochironomus	13	0.4	1800.0	1734.55
115	Endochironomus	27	0.023	265.8	32.39
116	Ferrissia rivularis	19	3.982	1636.4	475.39
117	Gammarus	11	3.982	144.8	129.64
118	Gammarus lacustris	5	0.023	39.9	.
119	Gammarus pseudolimnaeus	3	0.043	0.4	.
120	Glossiphonia complanata	8	0.4	32.6	.
121	Harmishia	18	3.982	1800.0	608.76
122	Helobdella fusca	4	3.08	32.3	.
123	Helobdella lineata	1	5.333	5.3	.
124	Isochaetides curvisetosus	2	3.982	56.4	.
125	Isochaetides freyi	5	0.061	56.4	.
126	Limnodrilus angustipenis	2	1.098	215.9	.
127	Limnodrilus cervix	68	0.476	445.5	95.44
128	Lirceus	11	20.588	1800.0	1468.97
129	Monodiamesa sp/depectina	5	10.588	1636.4	.
130	Nais bretheri	7	24.419	1636.4	.
131	Nais pardalis	4	25.932	1636.4	.
132	Nais simplex	6	3.982	173.6	.
133	Nilotanytus	1	58.333	58.3	.
134	Nyctiophylax	1	5	5.0	.
135	Orthocladus	6	0.667	68.9	.

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
136	Oxyethira	2	32.607	105.0	.
137	Pagastiella	3	105	1800.0	.
138	Paratanytarsus	10	0.667	476.4	435.00
139	Phylocentropus	17	0.276	203.0	84.26
140	Pisidium	80	0.078	1800.0	255.59
141	Pisidium ferrugineum	3	9.833	32.6	.
142	Pisidium ventricosum	3	0.4	265.8	.
143	Pisidium walkeri	6	0.769	265.8	.
144	Polycentropus	13	0.276	51.2	48.51
145	Potthastia	1	1636.364	1636.4	.
146	Potthastia longimana	3	0.345	12.4	.
147	Pristinella jenkiniae	2	3	23.0	.
148	Prometetus exacuus	3	0.435	15.1	.
149	Psectrocladius	7	3.982	1636.4	.
150	Pseudochironomus	3	12.4	1800.0	.
151	Pseudosmittia	2	15.556	260.0	.
152	Rheotanytarsus	9	20.588	1800.0	.
153	Rhyacodrilus coccineus	1	3.982	4.0	.
154	Saetheria	1	0.023	0.0	.
155	Sialis	1	0.056	0.1	.
156	Sphaerium	22	0.078	1800.0	1254.55
157	Stempellina	3	105	1800.0	.
158	Stylaria fossularis	1	105	105.0	.
159	Thienemanniella	4	39.286	1800.0	.
160	Trienodes	4	0.769	109.0	.
161	Vejdovskyella comata	2	25	1636.4	.

Table 3: Benzo[k]fluoranthene - Species Screening Level Concentrations (ug/g organic carbon).

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
1	Ablabesmyia sp	23	0.24	3045.5	189.95
2	Aelosoma sp	0	-	-	-
3	Amnicola limosa	62	0.267	3045.5	115.42
4	Asellus sp	40	0.4	1600.0	219.05
5	Aulodrilus limnobius	6	12.353	3045.5	-
6	Aulodrilus pigueti	21	2.609	3045.5	172.56
7	Aulodrilus pleurisetia	33	0.545	220.0	71.47
8	Bithynia tentaculata	3	2.941	106.7	-
9	Branchiura sowerbyi	12	5.238	125.4	101.71
10	Caenis sp	20	0.24	225.4	30.67
11	Ceraclea sp	18	3.261	225.4	114.21
12	Chaetogaster diaphanus	3	11.818	1100.0	-
13	Cheumatopsyche sp	25	2.778	225.4	156.95
14	Chironomus sp	64	0.267	225.4	116.05
15	Cladopelma sp	8	0.833	220.0	-
16	Cladotanytarsus sp	9	0.24	3045.5	-
17	Coelotanytarsus sp	14	2.609	45.5	40.81
18	Cricotopus sp	27	5.752	1600.0	192.32
19	Tribelos sp.	23	0.263	21.8	20.70
20	Cryptochironomus sp	71	0.5	3045.5	191.47
21	Dicrotendipes sp	27	0.24	1100.0	122.47
22	Eukiefferiella sp	2	254.545	3045.5	-
23	Gammarus fasciatus	70	0.4	225.4	101.44
24	Glossiphonia heteroclita	5	0.769	220.2	-
25	Glossosoma sp	0	-	-	-
26	Glyptotendipes sp	7	3.6	106.7	-
27	Gyraulius parvus	24	0.4	165.5	84.45
28	Helisoma anceps	6	5.752	220.0	-
29	Heterotrissocladius sp	1	1600	1600.0	-
30	Hyalella azteca	25	0.263	220.0	127.32
31	Hydropsyche sp	29	0.769	225.4	121.23
32	Hydroptila sp	5	11.475	165.5	-
33	Ilyodrilus templetoni	46	1.605	3045.5	122.47
34	Limnodrilus hoffmeisteri	140	0.435	225.4	95.81
35	Limnodrilus sp	31	0.5	3045.5	189.30
36	Limnodrilus udekemianus	57	1.111	225.4	80.37
37	Lumbriculus variegatus	11	0.732	220.0	185.77
38	Manayunkia speciosa	27	3.261	1600.0	388.42
39	Microtendipes sp	4	0.655	3045.5	-
40	Mystacides sp	4	12.162	3045.5	-
41	Nais behningi	2	16.957	21.0	-
42	Nais communis	3	44.091	82.2	-

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
43	<i>Nais variabilis</i>	20	5.238	210.5	192.22
44	<i>Nanocladius</i> sp	25	2.963	3045.5	575.23
45	<i>Neureclipsis</i> sp	8	2.778	3045.5	.
46	<i>Oecetis</i> sp	19	0.769	1600.0	225.39
47	<i>Parachironomus</i> sp	27	2.963	220.0	114.59
48	<i>Paralauterborniella</i> sp	5	5.752	3045.5	.
49	<i>Paratendipes</i> sp	4	2.609	220.0	.
50	<i>Phaenopsectra</i> sp	14	5.752	1600.0	1350.00
51	<i>Phallodrilus</i> sp	1	3045.455	3045.5	.
52	<i>Physella</i> <i>gyrina</i>	56	0.435	225.4	122.47
53	<i>Piguetiella michiganensis</i>	0	-	-	-
54	<i>Pisidium casertanum</i>	14	0.435	38.0	34.37
55	<i>Pisidium compressum</i>	1	6.774	6.8	.
56	<i>Pisidium conventus</i>	1	51.667	51.7	.
57	<i>Pisidium fallax</i>	0	-	-	-
58	<i>Pisidium henslowanum</i>	0	-	-	-
59	<i>Pisidium lilljeborgi</i>	1	8.25	8.3	.
60	<i>Pisidium nitidum</i>	0	-	-	-
61	<i>Pisidium variabile</i>	1	7.78	7.8	.
62	<i>Pleurocera acuta</i>	0	-	-	-
63	<i>Polypedilum scalaenum</i>	0	-	-	-
64	<i>Polypedilum</i> sp	40	0.267	225.4	159.64
65	<i>Pontoporeia hoyi</i>	2	0.645	19.4	.
66	<i>Potamothrix moldaviensis</i>	38	0.769	3045.5	187.91
67	<i>Potamothrix vejvodskyi</i>	25	2.444	210.5	81.14
68	<i>Pristina foreli</i>	0	-	-	-
69	<i>Pristina osborni</i>	0	-	-	-
70	<i>Procladius</i> sp	123	0.24	1600.0	71.09
71	<i>Prostoma rubrum</i>	44	2.609	1100.0	155.38
72	<i>Pseudocloeon</i> sp	1	3045.455	3045.5	.
73	<i>Quistadrilus multisetosus</i>	83	0.4	3045.5	143.99
74	<i>Slavina appendiculata</i>	12	5.238	193.0	158.42
75	<i>Specaria josinae</i>	1	44.091	44.1	.
76	<i>Sphaerium nitidum</i>	1	3045.455	3045.5	.
77	<i>Sphaerium striatinum</i>	20	0.4	3045.5	201.60
78	<i>Spirosperma ferox</i>	59	0.769	1100.0	125.36
79	<i>Stenonema</i> sp	2	19.412	49.0	.
80	<i>Stictochironomus</i> sp	11	2.609	3045.5	2480.36
81	<i>Stylaria lacustris</i>	23	2.963	210.5	115.96
82	<i>Stylodrilus heringianus</i>	21	2.609	1100.0	222.41
83	<i>Tanytarsus</i> sp	20	0.24	1600.0	183.41
84	<i>Thienemannimyia</i> sp	11	5.752	220.0	214.60
85	<i>Tubifex</i> sp	3	2.609	3045.5	.
86	<i>Turbellaria</i>	0	-	-	-
87	<i>Uncinaxis uncinata</i>	2	28	33.5	.
88	<i>Valvata sincera</i>	24	0.435	1600.0	175.46

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
89	Valvata tricarinata	21	0.435	185.4	46.33
90	Vejdovskyella intermedia	2	43.542	3045.5	.
91	Elliptio complanata	1	36.111	36.1	.
92	Sphaerium simile	0	-	-	-
93	Chironomus plumosus	7	2.941	15.3	.
94	Cricotopus bicinctus	5	7.78	220.2	.
95	Ephemera sp	1	220	220.0	.
96	Helobdella stagnalis	13	0.435	220.2	149.56
97	Hexagenia limbata	12	0.769	3045.5	2146.52
98	Hexagenia sp	32	0.24	1600.0	203.66
99	Tanytus sp	6	3.472	38.0	.
100	Tubifex tubifex	39	0.6	3045.5	125.36
101	Amphicaeta americana	1	1600	1600.0	.
102	Aulodrilus americanus	29	2.609	3045.5	220.00
103	Bithynia tentaculata	24	0.4	220.2	170.20
104	Caetogaster diastophus	2	1100	3045.5	.
105	Campeloma descisum	9	0.263	1600.0	.
106	Chaoborus punctipennis	19	0.24	29.1	13.64
107	Chironomus semireductus	0	-	-	-
108	Chironomus thummi	5	7.097	218.9	.
109	Crangonyx	6	8.605	165.5	.
110	Crangonyx gracilis	0	-	-	-
111	Cricotopus festivellus	0	-	-	-
112	Cricotopus sylvestris	2	7.78	220.2	.
113	Cryptotendipes	5	11.475	185.4	.
114	Demicryptochironomus	11	2.609	1600.0	1317.08
115	Endochironomus	20	0.267	220.2	91.72
116	Ferrissia rivularis	19	3.261	3045.5	225.39
117	Gammarus	11	2.444	165.5	140.86
118	Gammarus lacustris	2	15.733	3045.5	.
119	Gammarus pseudolimnaeus	0	-	-	-
120	Glossiphonia complanata	8	0.4	97.7	.
121	Harnishia	17	2.963	1600.0	496.00
122	Helobdella fusca	4	7.78	38.0	.
123	Helobdella lineata	0	-	-	-
124	Isochaetides curvisetosus	2	5.752	24.5	.
125	Isochaetides freyi	2	2.963	24.5	.
126	Limnodrilus angustipenis	1	101.852	101.9	.
127	Limnodrilus cervix	59	0.5	201.9	75.00
128	Lirceus	11	9.412	1600.0	1324.00
129	Monodiamesa sp/depectina	3	9.605	185.4	.
130	Nais bletcheri	6	10.267	1100.0	.
131	Nais pardalis	4	10.267	3045.5	.
132	Nais simplex	7	5.752	3045.5	.
133	Nilotanytus	2	77.778	3045.5	.
134	Nyctiophylax	1	5.05	5.1	.



Spp. No.	Species	N =	Minimum	Maximum	Concentration 90th percentile
135	Orthocladus	5	2.444	42.2	.
136	Oxyethira	2	36.75	220.0	.
137	Pagastiella	3	165.517	1600.0	.
138	Paratanytarsus	9	9.412	185.4	.
139	Phylocentropus	16	0.263	100.0	45.24
140	Pisidium	76	0.267	1600.0	136.93
141	Pisidium ferrugineum	3	13.19	97.7	.
142	Pisidium ventricosum	4	0.4	3045.5	.
143	Pisidium walkeri	6	0.769	220.2	.
144	Polycentropus	11	0.545	21.8	21.29
145	Potthastia	0	-	-	-
146	Potthastia longimana	1	8.25	8.3	.
147	Pristinella jenkiniae	1	3045.455	3045.5	.
148	Promenetus exacuus	3	0.435	13.2	.
149	Psectrocladius	5	5.752	1100.0	.
150	Pseudochironomus	3	8.25	1600.0	.
151	Pseudosmittia	3	15.556	3045.5	.
152	Rheotanytarsus	8	9.412	1600.0	.
153	Rhyacodrilus coccineus	1	5.752	5.8	.
154	Saetheria	1	3045.455	3045.5	.
155	Sialis	0	-	-	-
156	Sphaerium	19	0.732	1600.0	220.00
157	Stempellina	2	220	1600.0	.
158	Stylaria fossularis	2	220	3045.5	.
159	Thienemanniella	4	30.714	3045.5	.
160	Triacnodes	4	0.769	49.0	.
161	Vejdovskyella comata	2	44.091	3045.5	.

Table 4: Benzo[a]pyrene - Species Screening Level Concentrations (ug/g organic carbon).

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
1	Ablabesmyia sp	23	0.714	2181.818	332.7
2	Aelosoma sp	0	-	-	-
3	Amnicola limosa	75	0.023	2181.818	175
4	Asellus sp	64	0.023	2181.818	162.2
5	Aulodrilus limnobius	5	34.706	147.368	.
6	Aulodrilus pigueti	21	3.889	456.18	321.9
7	Aulodrilus pleurisetia	36	0.714	175	115.2
8	Bithynia tentaculata	3	5.294	65.169	.
9	Branchiura sowerbyi	12	10	217.5	184.9
10	Caenis sp	20	0.833	394.615	62.8
11	Ceraclea sp	18	6.522	394.615	228.1
12	Chaetogaster diaphanus	3	28.182	860	.
13	Cheumatopsyche sp	27	0.075	548.947	377.6
14	Chironomus sp	74	0.092	2181.818	147.8
15	Cladopelma sp	10	0.833	175	175
16	Cladotanytarsus sp	12	0.056	860	638.2
17	Coelotanytarsus sp	19	0.063	69	56
18	Cricotopus sp	32	0.909	2181.818	384.6
19	Tribelos sp.	23	0.714	47.059	39.2
20	Cryptochironomus sp	94	0.023	2181.818	162.2
21	Dicrotendipes sp	35	0.023	860	73.9
22	Eukiefferiella sp	1	490.909	490.909	.
23	Gammarus fasciatus	80	0.063	548.947	115.6
24	Glossiphonia heteroclita	5	0.769	149.474	.
25	Glossosoma sp	0	-	-	-
26	Glyptotendipes sp	16	0.023	65.169	37.3
27	Gyraulus parvus	24	0.4	217.5	97.9
28	Helisoma anceps	10	0.667	175	175
29	Heterotrissocladius sp	1	920	920	.
30	Hyalella azteca	31	0.023	209.63	164.1
31	Hydropsyche sp	30	0.769	2181.818	392.5
32	Hydroptila sp	5	21.311	120.69	.
33	Ilyodrilus templetoni	46	0.171	2181.818	257.9
34	Limnodrilus hoffmeisteri	187	0.03	681.053	110.3
35	Limnodrilus sp	30	0.171	352.273	208.1
36	Limnodrilus udekemianus	70	2.593	548.947	167.6
37	Lumbriculus variegatus	13	1.22	2181.818	1379.1
38	Manayunkia speciosa	28	4.867	2181.818	866
39	Microtendipes sp	4	3.448	10	.
40	Mystacides sp	3	20.27	51.818	.
41	Nais behningi	2	36.957	42.857	.
42	Nais communis	8	0.882	2181.818	.
43	Nais variabilis	22	4.867	2181.818	521.1

Spp. No.	Species	N =	Minimum	Maximum	Concentration 90th percentile
44	Nanocladius sp	24	4.444	860	471.8
45	Neureclipsis sp	7	3.889	394.615	.
46	Oecetis sp	22	0.255	2181.818	780.8
47	Parachironomus sp	29	0.023	209.63	175
48	Paralauterborniella sp	5	4.867	175	.
49	Paratendipes sp	6	5.652	2181.818	.
50	Phaenopsectra sp	18	4.867	920	866
51	Phalodrilus sp	0	-	-	-
52	Physella gyrina	59	0.317	548.947	209.6
53	Piguetiella michiganensis	0	-	-	-
54	Pisidium casertanum	28	0.023	45.769	26.7
55	Pisidium compressum	1	4.301	4.301	.
56	Pisidium conventus	1	116.364	116.364	.
57	Pisidium fallax	1	0.092	0.092	.
58	Pisidium henslowanum	0	-	-	-
59	Pisidium lilljeborgi	5	0.4	7.65	.
60	Pisidium nitidum	1	8.421	8.421	.
61	Pisidium variable	1	4.52	4.52	.
62	Pleurocera acuta	0	-	-	-
63	Polypedilum scalaenum	0	-	-	-
64	Polypedilum sp	47	0.345	2181.818	175
65	Pontoporeia hoyi	3	1.935	42.292	.
66	Potamothrix moldaviensis	42	0.317	548.947	203.8
67	Potamothrix vejvodskyi	32	1.162	548.947	109.4
68	Pristina foreli	1	8.421	8.421	.
69	Pristina osborni	0	-	-	-
70	Procladius sp	164	0.023	2181.818	74.4
71	Prostoma rubrum	45	3.889	2181.818	419.2
72	Pseudocloeon sp	0	-	-	-
73	Quistadrilus multisetosus	99	0.063	548.947	212.1
74	Slavina appendiculata	14	4.867	2181.818	1164.6
75	Specaria josinae	3	32.273	2181.818	.
76	Sphaerium nitidum	0	-	-	-
77	Sphaerium striatum	24	0.056	548.947	291.5
78	Spirosperma ferox	67	0.071	2181.818	248.7
79	Stenonema sp	2	33.235	87	.
80	Stictochironomus sp	11	5.652	175	175
81	Stylaria lacustris	23	4.444	548.947	214.4
82	Stylodrilus heringianus	21	5.652	860	530.4
83	Tanytarsus sp	38	0.023	2181.818	154.2
84	Thienemannimyia sp	22	0.071	175	166.7
85	Tubifex sp	2	5.652	548.947	.
86	Turbellaria	0	-	-	-
87	Uncinaiis uncinata	2	62.667	93	.
88	Valvata sincera	34	0.023	2181.818	288.4
89	Valvata tricarinata	23	0.345	456.18	102.5

Spp. No.	Species	N =	Minimum	Maximum	Concentration 90th percentile
90	Vejdovskyella intermedia	1	75.208	75.208	.
91	Elliptio complanata	1	33.333	33.333	.
92	Sphaerium simile	0	-	-	-
93	Chironomus plumosus	24	0.023	187.5	37.5
94	Cricotopus binctus	5	4.52	149.474	.
95	Ephemera sp	4	34.545	2181.818	.
96	Helobdella stagnalis	16	0.023	149.474	97.5
97	Hexagenia limbata	15	0.325	108.846	95.7
98	Hexagenia sp	35	0.345	2181.818	262.8
99	Tanyus sp	6	3.472	92.667	.
100	Tubifex tubifex	57	0.071	2181.818	84.7
101	Amphicaeta americana	3	0.8	920	.
102	Aulodrilus americanus	32	2	2181.818	437.7
103	Bithynia tentaculata	24	0.4	548.947	291.5
104	Caetogaster diastophus	1	860	860	.
105	Campeloma descisum	11	0.345	920	777.9
106	Chaoborus punctipennis	19	0.714	66.186	38.5
107	Chironomus semireductus	1	0.071	0.071	.
108	Chironomus thummi	13	0.03	681.053	480.4
109	Crangonyx	7	2	373.288	.
110	Crangonyx gracilis	1	0.325	0.325	.
111	Cricotopus festivellus	4	6.383	36.364	.
112	Cricotopus sylvestris	2	4.52	149.474	.
113	Cryptotendipes	7	18.056	456.18	.
114	Demicryptochironomus	12	4.444	2181.818	1803.3
115	Endochironomus	31	0.023	149.474	26.8
116	Ferrissia rivularis	19	3.5	2181.818	394.6
117	Gammarus	11	4.667	120.69	109.8
118	Gammarus lacustris	8	0.023	17	.
119	Gammarus pseudolimnaeus	3	0.03	3.438	.
120	Glossiphonia complanata	8	0.4	22.941	.
121	Harnishia	20	4.444	920	449.7
122	Helobdella fusca	4	4.52	28.182	.
123	Helobdella lineata	2	0.8	5.111	.
124	Isochaetides curvisetosus	2	4.867	51.818	.
125	Isochaetides freyi	8	0.03	51.818	.
126	Limnodrilus angustipenis	2	0.317	209.63	.
127	Limnodrilus cervix	68	0.171	390.909	110.5
128	Lirceus	12	19.209	920	696.5
129	Monodiamesa sp/depectina	5	10	2181.818	.
130	Nais brecheri	7	20	2181.818	.
131	Nais pardalis	4	20	2181.818	.
132	Nais simplex	6	4.867	217.5	.
133	Nilotanyus	1	52.778	52.778	.
134	Nyctiophylax	2	0.8	3.5	.
135	Orthocladus	8	0.5	51.111	.

Spp. No.	Species	N =	Minimum	Maximum	Concentration 90th percentile
136	Oxyethira	3	21.25	175	.
137	Pagastiella	4	120.69	920	.
138	Paratanytarsus	13	0.5	456.18	299.1
139	Phylocentropus	20	0.556	212.121	46.7
140	Pisidium	83	0.063	2181.818	298.4
141	Pisidium ferrugineum	3	0.556	21.25	.
142	Pisidium ventricosum	3	0.4	149.474	.
143	Pisidium walkeri	6	0.769	149.474	.
144	Polycentropus	14	0.317	47.059	40.1
145	Potthastia	2	0.929	2181.818	.
146	Potthastia longimana	2	0.345	7.65	.
147	Pristinella jenkinsae	2	5	6.897	.
148	Promenetus exacuouus	3	0.435	7.718	.
149	Psectrocladius	11	0.5	2181.818	1917.5
150	Pseudochironomus	3	7.65	920	.
151	Pseudosmittia	3	18.056	860	.
152	Rheotanytarsus	10	21.311	2181.818	2055.6
153	Rhyacodrilus coccineus	1	4.867	4.867	.
154	Saetheria	1	0.023	0.023	.
155	Sialis	2	0.056	1.243	.
156	Sphaerium	26	0.063	2181.818	522.6
157	Stempellina	4	175	2181.818	.
158	Stylaria fossularis	2	175	175	.
159	Thienemanniella	4	20	2181.818	.
160	Triaenodes	4	0.769	87	.
161	Vejdovskyella comata	3	32.273	2181.818	.

Table 5: Benzo[g,h,i]perylene - Species Screening Level Concentration (ug/g organic carbon).

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
1	Ablabesmyia sp	22	1.429	258.4	73.59
2	Aelosoma sp	0	-	-	-
3	Amnicola limosa	70	0.016	350.0	74.28
4	Asellus sp	58	0.016	350.0	46.50
5	Aulodrilus limnobius	5	3.684	112.5	.
6	Aulodrilus pigueti	20	2.778	258.4	166.39
7	Aulodrilus pleuriseteta	34	0.833	124.7	45.87
8	Bithynia tentaculata	3	2.941	42.7	.
9	Branchiura sowerbyi	12	4.762	137.1	115.50
10	Caenis sp	20	0.833	292.3	33.00
11	Ceraclea sp	18	5.435	292.3	142.23
12	Chaetogaster diaphanus	3	16.364	47.3	.
13	Cheumatopsyche sp	27	0.017	301.6	199.28
14	Chironomus sp	70	0.355	292.3	43.87
15	Cladopelma sp	8	0.833	45.0	.
16	Cladotanytarsus sp	11	0.028	40.0	39.59
17	Coelotanypus sp	17	0.016	44.0	33.60
18	Cricotopus sp	30	1.77	350.0	131.36
19	Tribelos sp.	23	0.833	22.4	17.93
20	Cryptochironomus sp	87	0.016	350.0	48.31
21	Dicrotendipes sp	32	0.02	258.4	41.89
22	Eukiefferiella sp	1	209.091	209.1	.
23	Gammarus fasciatus	77	0.016	301.6	67.94
24	Glossiphonia heteroclita	5	0.769	26.6	.
25	Glossosoma sp	0	-	-	-
26	Glyptotendipes sp	12	0.061	42.7	33.54
27	Gyraulus parvus	24	0.4	137.1	43.65
28	Helisoma anceps	7	0.167	37.9	.
29	Heterotrissocladius sp	1	350	350.0	.
30	Hyalella azteca	28	0.02	125.6	42.50
31	Hydropsyche sp	30	0.769	301.6	170.98
32	Hydroptila sp	5	11.475	37.9	.
33	Ilyodrilus templetoni	46	0.355	292.3	96.93
34	Limnodrilus hoffmeisteri	182	0.016	340.8	75.00
35	Limnodrilus sp	30	0.355	298.1	191.45
36	Limnodrilus udekemianus	69	1.77	301.6	124.68
37	Lumbriculus variegatus	11	1	77.3	71.05
38	Manayunkia speciosa	27	1.77	350.0	267.06
39	Microtendipes sp	4	1	8.8	.
40	Mystacides sp	3	4	28.2	.
41	Nais behningi	2	15.714	20.0	.
42	Nais communis	7	0.765	77.3	.



Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
43	<i>Nais variabilis</i>	20	1.77	301.6	246.30
44	<i>Nanocladus</i> sp	24	3.333	301.6	234.17
45	<i>Neureclipsis</i> sp	7	2.778	292.3	.
46	<i>Oecetis</i> sp	22	0.106	350.0	282.14
47	<i>Parachironomus</i> sp	26	3.333	125.6	69.41
48	<i>Paralauterborniella</i> sp	3	1.77	28.2	.
49	<i>Paratendipes</i> sp	4	1	77.3	.
50	<i>Phaenopsectra</i> sp	15	1.77	350.0	344.47
51	<i>Phallodrilus</i> sp	0	-	-	-
52	<i>Physella gyrina</i>	58	0.435	301.6	126.71
53	<i>Piguetiella michiganensis</i>	0	-	-	-
54	<i>Pisidium casertanum</i>	28	0.017	19.6	9.71
55	<i>Pisidium compressum</i>	1	4.301	4.3	.
56	<i>Pisidium conventus</i>	1	79.697	79.7	.
57	<i>Pisidium fallax</i>	0	-	-	-
58	<i>Pisidium henslowanum</i>	0	-	-	-
59	<i>Pisidium lilljeborgi</i>	5	0.222	1.2	.
60	<i>Pisidium nitidum</i>	1	1.053	1.1	.
61	<i>Pisidium variable</i>	1	0.4	0.4	.
62	<i>Pleurocera acuta</i>	0	-	-	-
63	<i>Polypedilum scalaenum</i>	0	-	-	-
64	<i>Polypedilum</i> sp	43	0.933	292.3	56.60
65	<i>Pontoporeia hoyi</i>	3	1.935	15.6	.
66	<i>Potamothrix moldaviensis</i>	43	0.769	301.6	135.46
67	<i>Potamothrix vej dovskyi</i>	31	0.446	301.6	72.65
68	<i>Pristina foreli</i>	1	1.053	1.1	.
69	<i>Pristina osborni</i>	0	-	-	-
70	<i>Procladius</i> sp	158	0.016	350.0	40.19
71	<i>Prostoma rubrum</i>	44	1.77	301.6	156.59
72	<i>Pseudocloeon</i> sp	0	-	-	-
73	<i>Quistadrilus multisetosus</i>	94	0.016	301.6	131.35
74	<i>Slavina appendiculata</i>	12	1.77	77.3	64.15
75	<i>Specaria josinae</i>	2	14.091	77.3	.
76	<i>Sphaerium nitidum</i>	0	-	-	-
77	<i>Sphaerium striatinum</i>	24	0.02	301.6	150.79
78	<i>Spirosperma ferox</i>	64	0.446	301.6	102.63
79	<i>Stenonema</i> sp	2	14.706	44.0	.
80	<i>Stictochironomus</i> sp	9	1	44.4	.
81	<i>Stylaria lacustris</i>	23	3.333	301.6	132.51
82	<i>Stylodrilus heringianus</i>	21	5.435	301.6	285.53
83	<i>Tanytarsus</i> sp	35	0.02	350.0	57.58
84	<i>Thienemannimyia</i> sp	16	0.017	37.9	33.12
85	<i>Tubifex</i> sp	2	5.652	301.6	.
86	<i>Turbellaria</i>	0	-	-	-
87	<i>Uncinaiis uncinata</i>	2	32	44.0	.
88	<i>Valvata sincera</i>	32	0.02	350.0	68.28

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
89	Valvata tricarinata	21	0.435	258.4	61.46
90	Vejdovskya intermedia	1	47.292	47.3	.
91	Elliptio complanata	1	3.611	3.6	.
92	Sphaerium simile	0	-	-	-
93	Chironomus plumosus	21	0.016	100.0	16.21
94	Cricotopus bicinctus	5	0.4	26.6	.
95	Ephemera sp	2	13.636	77.3	.
96	Helobdella stagnalis	15	0.435	47.3	34.91
97	Hexagenia limbata	13	0.769	65.0	56.60
98	Hexagenia sp	32	0.833	350.0	67.29
99	Tanytus sp	6	3.472	64.9	.
100	Tubifex tubifex	55	0.167	298.1	44.18
101	Amphicaeta americana	1	350	350.0	.
102	Aulodrilus americanus	30	0.952	301.6	246.30
103	Bithynia tentaculata	24	0.4	301.6	150.79
104	Caetogaster diastophus	1	40	40.0	.
105	Campeloma descisum	10	0.833	350.0	327.56
106	Chaoborus punctipennis	19	0.833	31.5	18.55
107	Chironomus semireductus	0	-	-	-
108	Chironomus thummi	15	0.061	340.8	216.08
109	Crangonyx	7	1.333	176.0	.
110	Crangonyx gracilis	0	-	-	-
111	Cricotopus festivellus	4	4.255	8.8	.
112	Cricotopus sylvestris	2	0.4	26.6	.
113	Cryptotendipes	5	3.611	258.4	.
114	Demicyptochironomus	12	3.333	350.0	322.53
115	Endochironomus	28	0.028	31.1	13.61
116	Ferrissia rivularis	19	1	292.3	77.27
117	Gammarus	11	1.77	44.4	43.14
118	Gammarus lacustris	6	0.028	1.4	.
119	Gammarus pseudolimnaeus	2	0.061	0.8	.
120	Glossiphonia complanata	8	0.4	11.2	.
121	Harnishia	17	1.77	350.0	276.74
122	Helobdella fusca	4	0.4	16.4	.
123	Helobdella lineata	1	5.333	5.3	.
124	Isochaetides curvisetosus	2	1.77	28.2	.
125	Isochaetides freyi	8	0.061	28.2	.
126	Limnodrilus angustipenis	2	1.439	125.6	.
127	Limnodrilus cervix	68	0.355	298.1	69.75
128	Lirceus	10	10.169	350.0	321.50
129	Monodiamesa sp/depectina	5	8.824	258.4	.
130	Nais brecheri	7	8	137.1	.
131	Nais pardalis	3	8	20.0	.
132	Nais simplex	6	1.77	137.1	.
133	Nilotanytus	0	-	-	-
134	Nyctiophylax	1	1	1.0	.

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
135	Orthocladius	7	0.167	44.4	.
136	Oxyethira	1	6.893	6.9	.
137	Pagastiella	2	37.931	350.0	.
138	Paratanytarsus	11	0.167	258.4	213.45
139	Phylocentropus	20	0.619	106.1	22.01
140	Pisidium	79	0.016	350.0	132.94
141	Pisidium ferrugineum	3	0.556	6.9	.
142	Pisidium ventricosum	3	0.4	26.6	.
143	Pisidium walkeri	6	0.769	26.6	.
144	Polycentropus	13	1.439	22.4	19.96
145	Potthastia	2	0.357	77.3	.
146	Potthastia longimana	1	1	1.0	.
147	Pristinella jenkiniae	2	4	4.6	.
148	Promectus exacuus	3	0.4	2.5	.
149	Psectrocladius	10	0.222	77.3	73.55
150	Pseudochironomus	3	1	350.0	.
151	Pseudosmittia	2	3.611	40.0	.
152	Rheotanytarsus	8	11.176	350.0	.
153	Rhyacodrilus coccineus	1	1.77	1.8	.
154	Saetheria	0	-	-	-
155	Sialis	2	0.028	0.5	.
156	Sphaerium	22	0.016	350.0	162.39
157	Stempellina	2	77.273	350.0	.
158	Stylaria fossularis	0	-	-	-
159	Thienemanniella	4	5.857	350.0	.
160	Trienodes	4	0.769	44.0	.
161	Vejdovskya comata	2	14.091	77.3	.

Table 6: Chrysene - Species Screening Level Concentrations (ug/g organic carbon).

Spp. No.	Species	N =	Minimum	Maximum	Concentration 90th percentile
1	Ablabesmyia sp	20	0.885	488.8	105.35
2	Aelosoma sp	0	-	-	-
3	Amnicola limosa	74	0.023	560.8	109.12
4	Asellus sp	63	0.023	560.8	95.83
5	Aulodrilus limnobius	5	17.544	92.9	.
6	Aulodrilus pigueti	20	5.4	488.8	342.93
7	Aulodrilus pleuriseta	33	0.885	128.5	101.03
8	Bithynia tentaculata	3	7.059	44.9	.
9	Branchiura sowerbyi	12	12.778	178.2	157.87
10	Caenis sp	20	1.667	560.8	75.36
11	Ceraclea sp	18	10.87	560.8	239.74
12	Chaetogaster diaphanus	3	23.636	128.5	.
13	Cheumatopsyche sp	27	0.075	560.8	372.46
14	Chironomus sp	69	0.647	677	68.89
15	Cladopelma sp	8	0.833	88.1	.
16	Cladotanytarsus sp	13	0.056	87	72.97
17	Coelotanyus sp	19	0.092	77	64.5
18	Cricotopus sp	29	0.885	488.8	194.57
19	Tribelos sp.	23	1.316	56.9	52.71
20	Cryptochironomus sp	92	0.023	560.8	116.42
21	Dicrotendipes sp	35	0.023	488.8	55.44
22	Eukiefferiella sp	1	863.636	863.6	.
23	Gammarus fasciatus	80	0.092	560.8	127.59
24	Glossiphonia heteroclita	5	0.769	240.4	.
25	Glossosoma sp	0	-	-	-
26	Glyptotendipes sp	16	0.023	44.9	39.73
27	Gyraulius parvus	25	0.4	178.2	98.33
28	Helisoma anceps	8	0.8	37.9	.
29	Heterotrissocladius sp	1	340	340	.
30	Hyaella azteca	30	0.023	204.1	78.06
31	Hydropsyche sp	30	0.769	560.8	351.44
32	Hydroptila sp	5	23.636	56.9	.
33	Ilyodrilus templetoni	45	3.158	560.8	142.69
34	Limnodrilus hoffmeisteri	187	0.056	609.1	113.15
35	Limnodrilus sp	30	2.4	441.1	307.99
36	Limnodrilus udekemianus	68	0.885	609.1	150.64
37	Lumbriculus variegatus	10	2.683	94.4	94.16
38	Manayunkia speciosa	26	0.885	488.8	374.78
39	Microtendipes sp	4	4.15	11.2	.
40	Mystacides sp	4	0.8	60	.
41	Nais behningi	2	35.217	53.3	.
42	Nais communis	6	0.647	528	.
43	Nais variabilis	18	0.885	488.8	400.82

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
44	Nanocladius sp	24	6.667	560.8	379.43
45	Neureclipsis sp	7	6.667	560.8	.
46	Oecetis sp	21	0.298	560.8	459.01
47	Parachironomus sp	27	0.023	204.1	120.91
48	Paralauterborniella sp	3	0.885	60	.
49	Paratendipes sp	3	5.652	37.9	.
50	Phaenopsectra sp	15	0.885	677	634.75
51	Phallodrilus sp	0	-	-	-
52	Physella gyrina	60	0.435	560.8	201.49
53	Piguetiella michiganensis	0	-	-	-
54	Pisidium casertanum	31	0.023	91.9	26.73
55	Pisidium compressum	1	4.301	4.3	.
56	Pisidium conventus	1	92.879	92.9	.
57	Pisidium fallax	1	0.092	0.1	.
58	Pisidium henslowanum				
59	Pisidium lilljeborgi	5	0.611	8	.
60	Pisidium nitidum	1	4.842	4.8	.
61	Pisidium variabile	1	1.68	1.7	.
62	Pleurocera acuta	0	-	-	-
63	Polypedium scalanum	0	-	-	-
64	Polypedium sp	44	0.345	560.8	98.67
65	Pontoporeia hoyi	3	2.258	54.6	.
66	Potamothrix moldaviensis	43	0.769	560.8	164.81
67	Potamothrix vejdoskyi	31	1.554	391.1	115.05
68	Pristina foreli	1	4.842	4.8	.
69	Pristina osborni	0	-	-	-
70	Procladius sp	164	0.023	597	72.67
71	Prostoma rubrum	43	0.885	560.8	302.32
72	Pseudocloeon sp	0	-	-	-
73	Quistadrilus multisetosus	99	0.092	609.1	184.85
74	Slavina appendiculata	10	0.885	60.6	60.53
75	Specaria josinae	1	6.364	6.4	.
76	Sphaerium nitidum	0	-	-	-
77	Sphaerium striatinum	25	0.056	391.1	269.57
78	Spirosperma ferox	67	0.164	560.8	130.84
79	Stenonema sp	2	47.059	119	.
80	Stictochironomus sp	8	5.652	119	.
81	Stylaria lacustris	23	6.667	391.1	193.73
82	Stylodrilus heringianus	21	5.652	560.8	469.22
83	Tanytarsus sp	39	0.023	488.8	60
84	Thienemannimyia sp	17	0.075	56.9	41.72
85	Tubifex sp	2	5.652	391.1	.
86	Turbellaria	0	-	-	-
87	Uncinaiis uncinata	2	44	87	.
88	Valvata sincera	34	0.023	488.8	110.23
89	Valvata tricarinata	25	0.345	488.8	117.65

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
90	Vejdovskyaella intermedia	1	128.542	128.5	.
91	Elliptio complanata	1	33.889	33.9	.
92	Sphaerium simile	0	-	-	.
93	Chironomus plumosus	25	0.023	300	35.96
94	Cricotopus bicinctus	5	1.68	240.4	.
95	Ephemera sp	1	50.909	50.9	.
96	Helobdella stagnalis	16	0.023	240.4	162.1
97	Hexagenia limbata	15	0.769	119	113.83
98	Hexagenia sp	32	0.345	560.8	101.3
99	Tanytus sp	6	12.222	77.4	.
100	Tubifex tubifex	55	0.092	367.8	66.26
101	Amphicaeta americana	3	1.2	340	.
102	Aulodrilus americanus	29	0.885	560.8	391.05
103	Bithynia tentaculata	24	0.4	391.1	304.1
104	Caetogaster diastrophus	1	52	52	.
105	Campeloma descium	10	0.345	204.1	190.12
106	Chaoborus punctipennis	19	1.316	74.7	30
107	Chironomus semireductus	1	0.164	0.2	.
108	Chironomus thummi	16	0.061	606.6	318.17
109	Crangonyx	7	4	367.8	.
110	Crangonyx gracilis	1	0.875	0.9	.
111	Cricotopus festivellus	4	9.574	45.5	.
112	Cricotopus sylvestris	2	1.68	240.4	.
113	Cryptotendipes	5	6.364	488.8	.
114	Demicryptochironomus	12	0.8	488.8	444.14
115	Endochironomus	31	0.023	240.4	31.32
116	Ferrisia rivularis	18	0.885	560.8	171.76
117	Gammarus	11	0.885	74.7	73.57
118	Gammarus lacustris	8	0.023	39.9	.
119	Gammarus pseudolimnaeus	4	0.061	4.2	.
120	Glossiphonia complanata	8	0.4	24.2	.
121	Harnishia	17	0.885	609.1	512.83
122	Helobdella fusca	4	1.68	24.1	.
123	Helobdella lineata	2	1.2	5.3	.
124	Isochaetides curvisetosus	2	0.885	60	.
125	Isochaetides freyi	8	0.061	60	.
126	Limnodrilus angustipenis	2	1.293	204.1	.
127	Limnodrilus cervix	68	0.741	609.1	112.9
128	Lirceus	10	23.636	340	317.04
129	Monodiamesa sp/depectina	4	11.176	488.8	.
130	Nais bretheri	6	29.07	178.2	.
131	Nais pardalis	3	26.271	35.2	.
132	Nais simplex	6	0.885	178.2	.
133	Nilotanytus	0	-	-	.
134	Nyctiophylax	2	1.2	4.2	.
135	Orthocladus	8	0.65	68.9	.



Spp. No.	Species	N =	Minimum	Maximum	Concentration 90th percentile
136	Oxyethira	1	24.214	24.2	.
137	Pagatiella	2	37.931	340	.
138	Paratanytarsus	13	0.65	488.8	317.49
139	Phylocentropus	21	1.316	184.8	56.81
140	Pisidium	79	0.092	560.8	178.21
141	Pisidium ferrugineum	3	6.306	24.2	.
142	Pisidium ventricosum	3	0.4	240.4	.
143	Pisidium walkeri	6	0.769	240.4	.
144	Polycentropus	14	0.875	56.5	51.77
145	Potthastia	1	1.429	1.4	.
146	Potthastia longimana	3	0.345	8	.
147	Pristinella jenkiniae	2	4	13.8	.
148	Promenetus exacuus	3	0.435	11.3	.
149	Psectrocladius	9	0.611	52	.
150	Pseudochironomus	3	7.95	340	.
151	Pseudosmittia	2	6.944	52	.
152	Rheotanytarsus	7	23.636	340	.
153	Rhyacodrilus coccineus	1	0.885	0.9	.
154	Saetheria	1	0.023	0	.
155	Sialis	2	0.056	1.4	.
156	Sphaerium	22	0.125	358	275.14
157	Stempellina	1	340	340	.
158	Stylaria fossularis	0	-	-	.
159	Thienemanniella	3	10.714	340	.
160	Trienodes	4	0.769	119	.
161	Vejdovskyella comata	1	6.364	6.4	.

Table 7: Dibenz[a,h]anthracene - Species Screening Level Concentrations (ug/g organic carbon).

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
1	Ablabesmyia sp	20	0.182	113.6	45.38
2	Aelosoma sp	0	-	-	-
3	Amnicola limosa	65	0.016	150.0	46.22
4	Asellus sp	49	0.016	150.0	44.41
5	Aulodrilus limnobius	4	0.08	14.0	.
6	Aulodrilus pigueti	20	0.87	49.3	46.59
7	Aulodrilus pleuriseta	33	0.058	44.4	13.48
8	Bithynia tentaculata	3	0.051	1.2	.
9	Branchiura sowerbyi	12	1.111	48.9	47.57
10	Caenis sp	20	0.24	76.9	11.80
11	Ceraclea sp	18	0.667	76.9	73.36
12	Chaetogaster diaphanus	2	5.455	12.7	.
13	Cheumatopsyche sp	26	1.111	137.9	74.15
14	Chironomus sp	69	0.051	113.6	18.97
15	Cladopelma sp	8	0.051	26.1	.
16	Cladotanytarsus sp	9	0.105	19.0	.
17	Coelotanypus sp	17	0.016	12.0	10.00
18	Cricotopus sp	29	0.037	150.0	48.93
19	Tribelos sp.	23	0.105	44.4	7.24
20	Cryptochironomus sp	76	0.016	150.0	15.78
21	Dicrotendipes sp	28	0.051	48.3	10.56
22	Eukiefferiella sp	1	56.364	56.4	.
23	Gammarus fasciatus	76	0.016	137.9	35.07
24	Glossiphonia heteroclita	5	0.769	10.4	.
25	Glossosoma sp	0	-	-	-
26	Glyptotendipes sp	10	0.051	9.2	9.08
27	Gyraulus parvus	23	0.4	48.9	16.46
28	Helisoma anceps	5	0.513	19.0	.
29	Heterotrissocladius sp	1	150	150.0	.
30	Hyalella azteca	25	0.105	73.0	16.43
31	Hydropsyche sp	30	0.741	137.9	76.53
32	Hydroptila sp	5	3.279	19.0	.
33	Ilyodrilus templetoni	46	0.037	113.6	36.42
34	Limnodrilus hoffmeisteri	173	0.016	137.9	12.43
35	Limnodrilus sp	30	0.039	26.4	2.21
36	Limnodrilus udekemianus	68	0.058	137.9	26.61
37	Lumbriculus variegatus	10	0.488	11.2	11.06
38	Manayunkia speciosa	24	1.111	150.0	125.77
39	Microtendipes sp	4	0.87	2.4	.
40	Mystacides sp	3	1.892	7.3	.
41	Nais behningi	2	5.652	7.6	.
42	Nais communis	7	0.235	113.6	.

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
43	<i>Nais variabilis</i>	18	1.905	137.9	116.06
44	<i>Nanocladus</i> sp	23	0.741	137.9	75.34
45	<i>Neureclipsis</i> sp	7	1.111	76.9	.
46	<i>Oecetis</i> sp	21	0.27	150.0	106.29
47	<i>Parachironomus</i> sp	26	0.741	73.0	22.59
48	<i>Paralauterborniella</i> sp	2	7.273	7.8	.
49	<i>Paratendipes</i> sp	4	0.87	113.6	.
50	<i>Phaenopsectra</i> sp	13	1.778	150.0	118.42
51	<i>Phallodrilus</i> sp	0	-	-	-
52	<i>Physella gyrina</i>	57	0.39	137.9	48.44
53	<i>Piguetiella michiganensis</i>	0	-	-	-
54	<i>Pisidium casertanum</i>	20	0.25	9.2	4.62
55	<i>Pisidium compressum</i>	1	4.301	4.3	.
56	<i>Pisidium conventus</i>	1	31.061	31.1	.
57	<i>Pisidium fallax</i>	0	-	-	-
58	<i>Pisidium henslowanum</i>	0	-	-	-
59	<i>Pisidium lilljeborgi</i>	2	0.27	1.0	.
60	<i>Pisidium nitidum</i>	1	1.053	1.1	.
61	<i>Pisidium variable</i>	1	1.04	1.0	.
62	<i>Pleurocera acuta</i>	0	-	-	-
63	<i>Polypedilum scalaeum</i>	0	-	-	-
64	<i>Polypedilum</i> sp	42	0.051	113.6	36.78
65	<i>Pontoporeia hoyi</i>	3	0.645	4.8	.
66	<i>Potamothrix moldaviensis</i>	43	0.39	137.9	46.75
67	<i>Potamothrix vejvodskyi</i>	31	0.203	137.9	41.74
68	<i>Pristina foreli</i>	1	1.053	1.1	.
69	<i>Pristina osborni</i>	0	-	-	-
70	<i>Procladius</i> sp	143	0.016	150.0	11.68
71	<i>Prostoma rubrum</i>	42	0.741	137.9	65.87
72	<i>Pseudocloeon</i> sp	0	-	-	-
73	<i>Quistadrilus multisetosus</i>	0.016	137.9	30.68	49.10
74	<i>Slavina appendiculata</i>	10	1.905	113.6	103.27
75	<i>Specaria josinae</i>	2	5	113.6	.
76	<i>Sphaerium nitidum</i>	0	-	-	-
77	<i>Sphaerium striatinum</i>	20	0.4	137.9	70.60
78	<i>Spirosperma ferox</i>	61	0.203	137.9	48.81
79	<i>Stenonema</i> sp	2	10	44.4	.
80	<i>Stictochironomus</i> sp	9	0.87	19.0	.
81	<i>Stylaria lacustris</i>	23	0.741	137.9	63.35
82	<i>Stylodrilus heringianus</i>	21	0.87	137.9	106.29
83	<i>Tanytarsus</i> sp	29	0.125	150.0	48.32
84	<i>Thienemannimyia</i> sp	16	0.727	150.0	124.55
85	<i>Tubifex</i> sp	2	0.87	137.9	.
86	<i>Turbellaria</i>	0	-	-	-
87	<i>Uncinaxis uncinata</i>	2	10	14.0	.
88	<i>Valvata sincera</i>	27	0.25	150.0	61.38

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
89	Valvata tricarinata	21	0.225	48.3	14.59
90	Vejdovskyella intermedia	1	12.708	12.7	.
91	Elliptio complanata	1	0.25	0.3	.
92	Sphaerium simile	0	-	-	-
93	Chironomus plumosus	16	0.016	18.1	9.68
94	Cricotopus bicinctus	5	0.513	10.4	.
95	Ephemera sp	2	2.909	113.6	.
96	Helobdella stagnalis	15	0.25	12.7	11.30
97	Hexagenia limbata	13	0.741	14.7	12.84
98	Hexagenia sp	32	0.105	150.0	59.54
99	Tanytus sp	6	0.112	14.5	.
100	Tubifex tubifex	53	0.043	113.6	11.62
101	Amphicaeta americana	2	2.5	150.0	.
102	Aulodrilus americanus	28	0.741	137.9	80.59
103	Bithynia tentaculata	24	0.051	137.9	61.14
104	Caetogaster diastophus	0	-	-	-
105	Campeoloma descisum	9	0.105	150.0	.
106	Chaoborus punctipennis	19	0.105	7.7	4.82
107	Chironomus semireductus	0	-	-	-
108	Chironomus thummi	8	0.25	71.1	.
109	Crangonyx	7	1.333	49.3	.
110	Crangonyx gracilis	0	-	-	-
111	Cricotopus festivellus	4	2.353	6.1	.
112	Cricotopus sylvestris	2	1.04	10.4	.
113	Cryptotendipes	5	3.279	48.3	.
114	Demicryptochironomus	12	0.741	150.0	139.09
115	Endochironomus	26	0.133	10.4	8.36
116	Ferrissia rivularis	18	1	113.6	80.59
117	Gammarus	10	0.444	19.0	18.23
118	Gammarus lacustris	3	0.27	1.3	.
119	Gammarus pseudolimnacus	0	-	-	-
120	Glossiphonia complanata	8	0.4	4.7	.
121	Harnishia	16	0.741	150.0	78.82
122	Helobdella fusca	4	0.667	5.5	.
123	Helobdella lineata	1	1.778	1.8	.
124	Isochaetides curvisetosus	1	7.273	7.3	.
125	Isochaetides freyi	5	0.27	7.3	.
126	Limnodrilus angustipenis	2	0.39	73.0	.
127	Limnodrilus cervix	68	0.043	48.9	11.67
128	Lirceus	10	2.825	150.0	136.91
129	Monodiamesa sp/depectina	5	2.353	113.6	.
130	Nais bretcheri	6	2.267	113.6	.
131	Nais pardalis	4	2.267	113.6	.
132	Nais simplex	5	1.111	48.9	.
133	Nilotanytus	0	-	-	-
134	Nyctiophylax	1	1	1.0	.

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
135	Orthocladus	5	0.214	11.6	.
136	Oxyethira	1	0.714	0.7	.
137	Pagastiella	2	18.966	150.0	.
138	Paratanytarsus	10	0.263	48.3	47.92
139	Phylocentropus	18	0.105	27.3	9.71
140	Pisidium	76	0.016	150.0	48.50
141	Pisidium ferrugineum	3	0.476	0.7	.
142	Pisidium ventricosum	3	0.4	10.4	.
143	Pisidium walkeri	6	0.513	10.4	.
144	Polycentropus	12	0.182	44.4	33.49
145	Potthastia	2	0.214	113.6	.
146	Potthastia longimana	1	1	1.0	.
147	Pristinella jenkiniae	2	4	4.6	.
148	Promenetus exacuus	3	0.435	1.0	.
149	Psectrocladius	7	0.25	113.6	.
150	Pseudochironomus	3	1	150.0	.
151	Pseudosmittia	1	15.556	15.6	.
152	Rheotanytarsus	8	2.174	150.0	.
153	Rhyacodrilus coccineus	0	-	-	-
154	Saetheria	0	-	-	-
155	Sialis	1	0.27	0.3	.
156	Sphaerium	22	0.016	150.0	84.21
157	Stempellina	2	113.7	150.0	.
158	Stylaria fossularis	0	-	-	-
159	Thienemanniella	0	-	-	-
160	Trienodes	3	0.769	10.0	.
161	Vejdovskiyella comata	2	5	113.6	.

Table 8: Fluoranthene - Species Screening Level Concentrations (ug/g organic carbon).

Spp. No.	Species	N =	Minimum	Maximum	Concentration 90th percentile
1	Ablabesmyia sp	23	1.429	1363.6	645.21
2	Aelosoma sp				
3	Amnicola limosa	68	0.057	1363.6	284.92
4	Asellus sp	54	0.057	1363.6	389.66
5	Aulodrilus limnobius	5	35.294	112.0	.
6	Aulodrilus pigueti	21	9.565	822.5	562.19
7	Aulodrilus pleuriset	36	1.429	262.7	173.55
8	Bithynia tentaculata	3	18.824	84.3	.
9	Branchiura sowerbyi	12	22.778	280.4	256.25
10	Caenis sp	20	2.083	1029.2	190.94
11	Ceraclea sp	18	16.304	1029.2	426.59
12	Chaetogaster diaphanus	3	29.091	262.7	.
13	Cheumatopsyche sp	25	10.8	1029.2	611.34
14	Chironomus sp	70	1	3291.6	178.76
15	Cladopelma sp	9	0.833	295.3	.
16	Cladotanytarsus sp	12	0.167	379.3	320.30
17	Coelotanytus sp	16	0.875	200.0	131.75
18	Cricotopus sp	31	3.636	1363.6	425.22
19	Tribelos sp.	23	1.429	179.1	110.41
20	Cryptochironomus sp	80	0.057	1363.6	278.59
21	Dicrotendipes sp	32	0.057	822.5	108.39
22	Eukiefferiella sp	1	2636.364	2636.4	.
23	Gammarus fasciatus	73	0.4	1029.2	307.74
24	Glossiphonia heteroclita	5	0.769	401.6	
25	Glossosoma sp				
26	Glyptotendipes sp	11	0.057	84.3	76.89
27	Gyraulidius parvus	24	0.4	379.3	271.53
28	Helisoma anceps	7	5.31	379.3	.
29	Heterotrissocladius sp	1	400	400.0	
30	Hyalella azteca	28	0.057	379.3	215.96
31	Hydropsyche sp	30	0.769	1363.6	619.58
32	Hydroptila sp	5	29.091	379.3	.
33	Ilyodrilus templetoni	46	3.421	1363.6	414.57
34	Limnodrilus hoffmeisteri	173	0.129	1454.5	230.84
35	Limnodrilus sp	30	3.421	1360.0	508.91
36	Limnodrilus udekemianus	69	0.476	1454.5	359.63
37	Lumbriculus variegatus	12	2.927	1363.6	1013.16
38	Manayunkia speciosa	28	5.31	1363.6	641.36
39	Microtendipes sp	4	11.25	21.7	.
40	Mystacides sp	3	14.143	95.5	.
41	Nais behningi	2	49.13	119.0	.
42	Nais communis	7	0.875	2694.5	.
43	Nais variabilis	21	5.31	1363.6	778.93



Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
44	Nanocladius sp	24	12.222	1029.2	612.99
45	Neureclipsis sp	7	13.333	1029.2	.
46	Oecetis sp	20	0.769	1363.6	1008.56
47	Parachironomus sp	27	12.222	379.3	332.73
48	Paralauterborniella sp	4	5.31	123.3	.
49	Paratendipes sp	5	9.05	1363.6	.
50	Phaenopsectra sp	16	5.31	3291.6	1865.05
51	Phallodrilus sp	.	.	.	.
52	Physella gyrina	58	0.435	1029.2	363.83
53	Piguetiella michiganensis	.	.	.	.
54	Pisidium casertanum	22	0.057	195.4	71.72
55	Pisidium compressum	1	4.301	4.3	.
56	Pisidium conventus	1	159.545	159.5	.
57	Pisidium fallax	.	.	.	.
58	Pisidium henslowanum	.	.	.	.
59	Pisidium lilljeborgi	2	6	9.1	.
60	Pisidium nitidum	1	6.105	6.1	.
61	Pisidium variabile	1	2.1	2.1	.
62	Pleurocera acuta	.	.	.	.
63	Polypedilum scalaenum	.	.	.	.
64	Polypedilum sp	45	1.207	1363.6	347.32
65	Pontoporeia hoyi	3	2.903	102.1	.
66	Potamothrix moldaviensis	42	0.769	1029.2	521.12
67	Potamothrix vejdoskyi	31	6	604.7	266.85
68	Pristina foreli	1	6.105	6.1	.
69	Pristina osborni	.	.	.	.
70	Procladius sp	147	0.057	2863.6	176.97
71	Prostoma rubrum	45	5.31	1363.6	611.34
72	Pseudocloeon sp	.	.	.	.
73	Quistadrilus multisetosus	88	0.4	1454.5	329.36
74	Slavina appendiculata	13	5.31	1363.6	861.96
75	Specaria josinae	2	26.818	1363.6	.
76	Sphaerium nitidum	.	.	.	.
77	Sphaerium striatinum	23	0.167	621.2	506.69
78	Spirosperma ferox	61	0.769	1363.6	352.80
79	Stenonema sp	2	179.118	326.0	.
80	Stictochironomus sp	10	9.05	379.3	373.98
81	Stylaria lacustris	23	12.222	604.7	346.18
82	Stylodrilus heringianus	21	9.565	1029.2	782.22
83	Tanytarsus sp	32	0.057	1363.6	393.79
84	Thienemannimyia sp	16	5.31	379.3	200.09
85	Tubifex sp	2	9.565	604.7	.
86	Turbellaria	.	.	.	.
87	Uncinaiis uncinata	2	44	112.0	.
88	Valvata sincera	28	0.057	1363.6	442.25
89	Valvata tricarinata	22	0.435	822.5	235.70

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
90	Vejdovskyella intermedia	1	262.708	262.7	.
91	Elliptio complanata	1	66.667	66.7	.
92	Sphaerium simile				
93	Chironomus plumosus	17	0.057	687.5	282.96
94	Cricotopus bicinctus	5	2.1	401.6	.
95	Ephemera sp	3	70	1363.6	.
96	Helobdella stagnalis	16	0.057	401.6	304.39
97	Hexagenia limbata	13	0.769	326.0	264.68
98	Hexagenia sp	34	1.207	1363.6	389.66
99	Tanytus sp	6	16.111	172.9	.
100	Tubifex tubifex	53	0.833	1363.6	174.50
101	Amphicaeta americana	1	400	400.0	.
102	Aulodrilus americanus	31	5.31	1363.6	778.93
103	Bithynia tentaculata	24	0.4	621.2	503.18
104	Caetogaster diastophus	1	106	106.0	.
105	Campeoloma descium	11	1.207	400.0	391.93
106	Chaoborus punctipennis	19	1.429	127.8	52.17
107	Chironomus semireductus				
108	Chironomus thummi	7	0.212	1253.7	.
109	Crangonyx	7	5.333	621.2	.
110	Crangonyx gracilis				
111	Cricotopus festivellus	4	21.176	181.8	.
112	Cricotopus sylvestris	2	2.1	401.6	.
113	Cryptotendipes	5	6.944	822.5	.
114	Demicryptochironomus	12	9.565	1363.6	1201.29
115	Endochironomus	26	0.057	401.6	43.89
116	Ferrissia rivularis	19	5.31	1363.6	1029.23
117	Gammarus	11	5.31	379.3	338.56
118	Gammarus lacustris	5	0.057	31.9	.
119	Gammarus pseudolimnaeus	2	0.129	0.2	.
120	Glossiphonia complanata	8	0.4	41.1	.
121	Harnishia	18	5.31	1454.5	885.68
122	Helobdella fusca	4	2.1	30.0	.
123	Helobdella lineata	1	15.333	15.3	.
124	Isochaetides curvisetosus	2	5.31	95.5	.
125	Isochaetides freyi	5	0.212	95.5	.
126	Limnodrilus angustipenis	2	2.561	359.6	.
127	Limnodrilus cervix	68	0.476	1454.5	182.69
128	Lirceus	11	29.091	400.0	395.86
129	Monodiamesa sp/depectina	5	21.176	1363.6	.
130	Nais brecheri	7	38.372	1363.6	.
131	Nais pardalis	4	49.13	1363.6	.
132	Nais simplex	6	5.31	280.4	.
133	Nilotanytus	1	47.222	47.2	.
134	Nyctiophylax	1	11.25	11.3	.
135	Orthocladius	5	2.083	175.6	.

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
136	Oxyethira	2	41.143	70.0	.
137	Pagastiella	3	70	400.0	.
138	Paratanytarsus	9	28.233	822.5	.
139	Phylocentropus	17	2.083	300.0	158.62
140	Pisidium	79	2.083	1363.6	400.00
141	Pisidium ferrugineum	3	8.833	41.1	.
142	Pisidium ventricosum	3	0.4	401.6	.
143	Pisidium walkeri	6	0.769	401.6	.
144	Polycentropus	12	2.561	179.1	148.32
145	Potthastia	1	1363.7	1363.6	.
146	Potthastia longimana	2	1.207	9.1	.
147	Pristinella jenkiniae	2	6	47.1	.
148	Promenetus exacuus	3	0.435	18.4	.
149	Psectrocladius	7	5.31	1363.6	.
150	Pseudochironomus	3	9.05	400.0	.
151	Pseudosmittia	2	6.944	106.0	.
152	Rheotanytarsus	9	29.091	1363.6	.
153	Rhyacodrilus coccineus	1	5.31	5.3	.
154	Saetheria	1	0.057	0.1	.
155	Sialis	1	0.167	0.2	.
156	Sphaerium	21	2.927	1363.6	807.27
157	Stempellina	3	70	1363.6	.
158	Stylaria fossularis	1	70	70.0	.
159	Thienemanniella	4	92.857	1363.6	.
160	Trienodes	4	0.769	326.0	.
161	Vejdovskyella comata	2	26.818	1363.6	.

Table 9: Fluorene - Species Screening Level Concentrations (ug/g organic carbon).

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
1	Ablabesmyia sp	22	0.714	158.8	140.58
2	Aelosoma sp	0	-	-	-
3	Amnicola limosa	61	0.4	156.2	41.05
4	Asellus sp	44	0.235	156.2	63.16
5	Aulodrilus limnobius	5	1.176	14.1	.
6	Aulodrilus pigueti	21	0.87	119.7	49.85
7	Aulodrilus pleuriseta	34	0.714	37.7	22.98
8	Bithynia tentaculata	3	1.176	20.2	.
9	Branchiura sowerbyi	12	1.111	39.0	32.94
10	Caenis sp	20	0.833	158.8	151.34
11	Ceraclea sp	18	0.667	156.2	133.62
12	Chaetogaster diaphanus	3	1.818	27.5	.
13	Cheumatopsyche sp	25	0.444	156.2	134.67
14	Chironomus sp	68	0.235	378.1	40.15
15	Cladopelma sp	8	0.833	33.3	.
16	Cladotanytarsus sp	10	0.833	108.0	105.13
17	Coelotanytus sp	16	0.25	39.0	25.70
18	Cricotopus sp	28	0.889	154.5	81.38
19	Tribelos sp.	23	0.714	158.8	34.88
20	Cryptochironomus sp	72	0.25	161.9	36.25
21	Dicrotendipes sp	27	0.25	158.8	62.05
22	Eukiefferiella sp	1	209.1	209.1	.
23	Gammarus fasciatus	73	0.235	156.2	40.63
24	Glossiphonia heteroclita	5	0.769	13.3	.
25	Glossosoma sp	0	-	-	-
26	Glyptotendipes sp	8	0.25	20.2	.
27	Gyraulus parvus	23	0.4	79.3	34.40
28	Helisoma anceps	5	0.909	79.3	.
29	Heterotrissocladius sp	0	-	-	-
30	Hyalella azteca	24	0.645	158.8	105.21
31	Hydropsyche sp	30	0.741	156.2	139.11
32	Hydroptila sp	5	1.176	79.3	.
33	Ilyodrilus templetoni	46	0.444	346.9	68.82
34	Limnodrilus hoffmeisteri	166	0.235	376.3	40.44
35	Limnodrilus sp	30	1.471	346.9	128.54
36	Limnodrilus udekemianus	67	0.476	318.2	93.96
37	Lumbriculus variegatus	10	0.488	20.0	19.75
38	Manayunkia speciosa	26	1.111	154.5	133.78
39	Microtendipes sp	4	1	37.7	.
40	Mystacides sp	3	3.476	6.8	.
41	Nais behningi	2	3.913	13.8	.
42	Nais communis	6	0.235	286.4	.
43	Nais variabilis	19	1.176	154.5	140.00

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
44	Nanocladius sp	24	0.741	156.2	135.56
45	Neureclipsis sp	7	1.176	156.2	.
46	Oecetis sp	19	0.769	156.2	154.55
47	Parachironomus sp	26	0.741	131.1	56.69
48	Paralauterborniella sp	2	5.455	12.1	.
49	Paratendipes sp	4	0.87	154.5	.
50	Phaenopsectra sp	13	0.889	378.1	377.38
51	Phallodrilus sp	0	-	-	-
52	Physella gyrina	56	0.435	156.2	48.07
53	Piguetiella michiganensis	0	-	-	-
54	Pisidium casertanum	18	0.4	20.0	15.82
55	Pisidium compressum	1	2.151	2.2	.
56	Pisidium conventus	1	39.394	39.4	.
57	Pisidium fallax	0	-	-	-
58	Pisidium henslowanum	0	-	-	-
59	Pisidium lilljeborgi	1	1	1.0	.
60	Pisidium nitidum	1	5.316	5.3	.
61	Pisidium variabile	1	0.4	0.4	.
62	Pleurocera acuta	0	-	-	-
63	Polypedium scalaenum	0	-	-	-
64	Polypedium sp	42	0.645	156.2	49.49
65	Pontoporeia hoyi	3	0.645	13.1	.
66	Potamothrix moldaviensis	42	0.741	156.2	48.69
67	Potamothrix vej dovskyi	30	0.444	140.0	39.36
68	Pristina foreli	1	5.316	5.3	.
69	Pristina osborni	0	-	-	-
70	Procladius sp	137	0.22	293.9	38.15
71	Prostoma rubrum	44	0.741	156.2	125.42
72	Pseudocloeon sp	0	-	-	-
73	Quistadrilus multisetosus	85	0.4	346.9	48.43
74	Slavina appendiculata	11	1.818	154.5	125.40
75	Specaria josinae	1	154.5	154.5	.
76	Sphaerium nitidum	0	-	-	-
77	Sphaerium striatinum	20	0.4	140.0	129.97
78	Spirosperma ferox	60	0.667	156.2	50.21
79	Stenonema sp	2	10.9	47.0	.
80	Stictochironomus sp	9	0.87	79.3	.
81	Stylaria lacustris	23	0.741	140.0	97.47
82	Stylodrilus heringianus	22	0.87	156.2	150.18
83	Tanytarsus sp	25	0.235	158.8	126.62
84	Thienemannimyia sp	13	0.909	79.3	52.41
85	Tubifex sp	2	0.87	140.0	.
86	Turbellaria	0	-	-	-
87	Uncinaiis uncinata	2	1.333	6.5	.
88	Valvata sincera	23	0.4	154.5	67.81
89	Valvata tricarinata	20	0.435	50.6	31.25

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
90	Vejdovskya intermedia	1	27.5	27.5	.
91	Elliptio complanata	1	1.972	2.0	.
92	Sphaerium simile	0	-	-	.
93	Chironomus plumosus	13	0.308	87.5	61.59
94	Cricotopus bicinctus	5	0.4	13.3	.
95	Ephemera sp	2	7.545	154.5	.
96	Helobdella stagnalis	15	0.25	27.5	22.28
97	Hexagenia limbata	13	0.741	47.0	44.78
98	Hexagenia sp	31	0.714	158.8	145.24
99	Tanytus sp	6	1.605	13.2	.
100	Tubifex tubifex	52	0.2	154.5	18.80
101	Amphicaeta americana	0	-	-	.
102	Aulodrilus americanus	29	0.741	156.2	140.00
103	Bithynia tentaculata	24	0.4	161.9	135.56
104	Caetogaster diastophus	1	12	12.0	.
105	Campeoloma descisum	8	0.833	131.1	.
106	Chaoborus punctipennis	19	0.714	108.0	44.00
107	Chironomus semireductus	0	-	-	.
108	Chironomus thummi	5	2.903	376.3	.
109	Crangonyx	7	1.333	119.7	.
110	Crangonyx gracilis	0	-	-	.
111	Cricotopus festivellus	4	2.353	22.7	.
112	Cricotopus sylvestris	2	0.4	13.3	.
113	Cryptotendipes	4	5.455	50.6	.
114	Demicryptochironomus	11	0.741	154.5	133.75
115	Endochironomus	22	0.4	158.8	25.45
116	Ferrissia rivularis	18	1	156.2	154.71
117	Gammarus	10	0.444	79.3	73.14
118	Gammarus lacustris	1	8.4	8.4	.
119	Gammarus pseudolimnacus	0	-	-	.
120	Glossiphonia complanata	8	0.4	2.5	.
121	Harnishia	15	0.741	318.2	157.61
122	Helobdella fusca	4	0.4	1.8	.
123	Helobdella lineata	1	0.889	0.9	.
124	Isochaetides curvisetosus	1	5.455	5.5	.
125	Isochaetides freyi	3	0.741	5.5	.
126	Limnodrilus angustipenis	1	131.1	131.1	.
127	Limnodrilus cervix	68	0.741	346.9	32.05
128	Lirceus	9	1.176	79.3	.
129	Monodiamesa sp/depectina	5	2.353	154.5	.
130	Nais bretheri	7	2.326	154.5	.
131	Nais pardalis	4	3.913	154.5	.
132	Nais simplex	5	1.111	18.9	.
133	Notanypus	1	4.722	4.7	.
134	Nyctiophylax	1	1	1.0	.
135	Orthocladus	4	0.444	17.6	.



Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
136	Oxyethira	1	0.714	0.7	.
137	Pagastiella	1	79.31	79.3	.
138	Paratanytarsus	9	0.667	50.6	.
139	Phylocentropus	17	0.833	45.5	44.29
140	Pisidium	76	0.741	346.9	71.31
141	Pisidium ferrugineum	3	0.476	0.7	.
142	Pisidium ventricosum	3	0.4	13.3	.
143	Pisidium walkeri	6	0.667	13.3	.
144	Polycentropus	10	1.111	10.9	10.38
145	Potthastia	1	154.5	154.5	.
146	Potthastia longimana	1	1	1.0	.
147	Pristinella jenkiniae	2	4	13.8	.
148	Promenetus exacuous	3	0.4	2.5	.
149	Psectrocladius	6	1.818	154.5	.
150	Pseudochironomus	2	1	5.9	.
151	Pseudosmittia	2	10	12.0	.
152	Rheotanytarsus	7	1.176	154.5	.
153	Rhyacodrilus coccineus	0	-	-	-
154	Saetheria	0	-	-	-
155	Sialis	0	-	-	-
156	Sphaerium	19	0.476	346.9	161.91
157	Stempellina	1	154.5	154.5	.
158	Stylaria fossularis	0	-	-	-
159	Thienemanniella	3	12	154.5	.
160	Trienodes	3	0.769	47.0	.
161	Vejdovskyella comata	1	154.5	154.5	.

Table 10: Indeno[1,2,3-cd]pyrene - Species Screening Level Concentrations (ug/g organic carbon).

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
1	Ablabesmyia sp	22	1.455	222.7	170.89
2	Aelosoma sp	0	-	-	-
3	Amnicola limosa	73	0.045	400.0	105.61
4	Asellus sp	64	0.045	478.4	74.56
5	Aulodrilus limnobius	5	12.105	94.6	.
6	Aulodrilus pigueti	20	2.778	212.4	186.96
7	Aulodrilus pleurisetia	34	0.833	94.8	51.42
8	Bithynia tentaculata	3	2.778	42.7	.
9	Branchiura sowerbyi	12	6.19	126.4	110.74
10	Caenis sp	20	0.833	400.0	38.24
11	Ceraclea sp	18	0.667	400.0	90.00
12	Chaetogaster diaphanus	3	19.091	140.0	.
13	Cheumatopsyche sp	27	0.125	478.4	235.18
14	Chironomus sp	69	0.289	400.0	44.44
15	Cladopelma sp	8	0.833	44.7	.
16	Cladotanytarsus sp	12	0.056	140.0	110.41
17	Coelotanytus sp	19	0.078	52.0	33.00
18	Cricotopus sp	30	1.77	360.0	203.77
19	Tribelos sp.	23	0.833	25.9	24.77
20	Cryptochironomus sp	92	0.045	400.0	72.42
21	Dicretodipus sp	34	0.045	212.4	58.85
22	Eukiefferiella sp	1	281.818	281.8	.
23	Gammarus fasciatus	79	0.078	478.4	78.33
24	Glossiphonia heteroclita	5	0.769	24.3	.
25	Glossosoma sp	0	-	-	-
26	Glyptotendipes sp	16	0.045	78.3	53.39
27	Gyraulus parvus	25	0.4	126.4	48.16
28	Helisoma anceps	7	1.167	41.4	.
29	Heterotrissocladius sp	1	360	360.0	.
30	Hyalella azteca	30	0.045	166.7	41.33
31	Hydropsyche sp	31	0.769	478.4	216.98
32	Hydroptila sp	5	13.115	41.4	.
33	Ilyodrilus templetoni	46	0.289	400.0	124.58
34	Limnodrilus hoffmeisteri	187	0.056	478.4	59.69
35	Limnodrilus sp	30	0.289	182.7	94.37
36	Limnodrilus udekemianus	69	0.476	478.4	94.81
37	Lumbriculus variegatus	10	1	56.5	55.41
38	Manayunkia speciosa	27	1.77	478.4	250.18
39	Microtendipes sp	4	1	8.8	.
40	Mystacides sp	3	5.238	32.7	.
41	Nais behningi	2	27.391	29.0	.
42	Nais communis	7	0.412	222.7	.

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
43	<i>Nais variabilis</i>	20	1.77	478.4	221.69
44	<i>Nanocladus</i> sp	24	4.348	478.4	296.99
45	<i>Neureclipsis</i> sp	7	2.778	400.0	.
46	<i>Oecetis</i> sp	22	0.617	400.0	318.82
47	<i>Parachironomus</i> sp	27	0.045	166.7	84.76
48	<i>Paralauterborniella</i> sp	3	1.77	32.7	.
49	<i>Paratendipes</i> sp	4	1	222.7	.
50	<i>Phaenopsectra</i> sp	16	1.77	360.0	315.05
51	<i>Phallodrilus</i> sp	0	-	-	-
52	<i>Physella gyrina</i>	60	0.435	478.4	126.17
53	<i>Piguetiella michiganensis</i>	0	-	-	-
54	<i>Pisidium casertanum</i>	30	0.045	22.3	8.96
55	<i>Pisidium compressum</i>	1	4.301	4.3	.
56	<i>Pisidium conventus</i>	1	123.788	123.8	.
57	<i>Pisidium fallax</i>	1	0.154	0.2	.
58	<i>Pisidium henslowanum</i>	0	-	-	-
59	<i>Pisidium lilljeborgi</i>	5	0.806	5.6	.
60	<i>Pisidium nitidum</i>	1	1.053	1.1	.
61	<i>Pisidium variable</i>	1	0.4	0.4	.
62	<i>Pleurocera acuta</i>	0	-	-	-
63	<i>Polypedilum scalaenum</i>	0	-	-	-
64	<i>Polypedilum</i> sp	44	0.69	400.0	74.56
65	<i>Pontoporeia hoyi</i>	3	1.935	19.0	.
66	<i>Potamothrix moldaviensis</i>	43	0.769	478.4	125.37
67	<i>Potamothrix vej dovskyi</i>	31	1.622	478.4	114.03
68	<i>Pristina foreli</i>	1	1.053	1.1	.
69	<i>Pristina osborni</i>	0	-	-	-
70	<i>Procladius</i> sp	165	0.045	360.0	41.91
71	<i>Prostoma rubrum</i>	44	1.77	478.4	203.17
72	<i>Pseudocloeon</i> sp	0	-	-	-
73	<i>Quistadrilus multisetosus</i>	97	0.078	478.4	116.58
74	<i>Slavina appendiculata</i>	12	1.77	222.7	167.56
75	<i>Specaria josinae</i>	2	15.455	222.7	.
76	<i>Sphaerium nitidum</i>	0	-	-	-
77	<i>Sphaerium striatinum</i>	25	0.056	478.4	177.59
78	<i>Spirosperma ferox</i>	67	0.093	478.4	145.33
79	<i>Stenonema</i> sp	2	24.412	75.0	.
80	<i>Stictochironomus</i> sp	9	1	75.0	.
81	<i>Stylaria lacustris</i>	23	4.444	478.4	150.57
82	<i>Stylodrilus heringianus</i>	22	4.348	478.4	346.82
83	<i>Tanytarsus</i> sp	39	0.045	360.0	44.44
84	<i>Thienemannimyia</i> sp	17	0.093	78.3	48.77
85	<i>Tubifex</i> sp	2	6.957	478.4	.
86	<i>Turbellaria</i>	0	-	-	-
87	<i>Uncinaiis uncinata</i>	2	34	44.5	.
88	<i>Valvata sincera</i>	33	0.045	360.0	52.80

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
89	Valvata tricarinata	23	0.435	212.4	68.71
90	Vejdovskya intermedia	1	58.333	58.3	.
91	Elliptio complanata	1	2.778	2.8	.
92	Sphaerium simile	0	-	-	-
93	Chironomus plumosus	26	0.045	93.8	11.72
94	Cricotopus bicinctus	5	0.4	24.3	.
95	Ephemera sp	2	15.455	222.7	.
96	Helobdella stagnalis	16	0.045	58.3	37.94
97	Hexagenia limbata	14	0.769	75.0	74.56
98	Hexagenia sp	33	0.69	400.0	163.64
99	Tanytus sp	6	3.472	61.6	.
100	Tubifex tubifex	57	0.093	222.7	53.72
101	Amphicaeta americana	1	360	360.0	.
102	Aulodrilus americanus	30	0.952	478.4	221.69
103	Bithynia tentaculata	24	0.4	478.4	180.32
104	Caetogaster diastophus	1	140	140.0	.
105	Campeloma descisum	11	0.69	360.0	321.33
106	Chaoborus punctipennis	19	0.833	33.4	18.18
107	Chironomus semireductus	1	0.093	0.1	.
108	Chironomus thummi	16	0.152	295.8	136.67
109	Crangonyx	7	1.333	194.0	.
110	Crangonyx gracilis	1	0.825	0.8	.
111	Cricotopus festivellus	4	4.255	8.8	.
112	Cricotopus sylvestris	2	0.4	24.3	.
113	Cryptotendipes	5	13.115	212.4	.
114	Demicyptochironomus	12	4.444	360.0	318.82
115	Endochironomus	31	0.045	78.3	21.24
116	Ferrissia rivularis	19	1	400.0	222.73
117	Gammarus	11	1.77	44.4	43.83
118	Gammarus lacustris	8	0.045	7.8	.
119	Gammarus pseudolimnaeus	3	0.114	5.6	.
120	Glossiphonia complanata	8	0.4	12.4	.
121	Harnishia	17	1.77	360.0	241.89
122	Helobdella fusca	4	0.4	19.1	.
123	Helobdella lineata	1	5.111	5.1	.
124	Isochaetides curvisetosus	2	1.77	32.7	.
125	Isochaetides freyi	8	0.152	32.7	.
126	Limnodrilus angustipenis	2	1.951	166.7	.
127	Limnodrilus cervix	67	0.289	190.9	78.22
128	Lirceus	10	12.353	360.0	331.41
129	Monodiamesa sp/depectina	5	8.824	222.7	.
130	Nais brecheri	7	9.733	222.7	.
131	Nais pardalis	4	9.733	222.7	.
132	Nais simplex	6	1.77	126.4	.
133	Nilotanytus	0	-	-	-
134	Nyctiophylax	1	1	1.0	.

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
135	Orthocladius	4	0.833	44.4	.
136	Oxyethira	1	5.286	5.3	.
137	Pagastiella	2	41.379	360.0	.
138	Paratanytarsus	16	0.667	212.4	90.88
139	Phylocentropus	17	0.833	25.9	25.18
140	Pisidium	80	0.078	478.4	138.64
141	Pisidium ferrugineum	3	0.476	5.3	.
142	Pisidium ventricosum	3	0.4	24.3	.
143	Pisidium walkeri	6	0.667	24.3	.
144	Polycentropus	14	0.825	78.3	52.11
145	Potthastia	2	1.214	222.7	.
146	Potthastia longimana	2	0.69	1.0	.
147	Pristinella jenkiniae	2	4.598	5.0	.
148	Promenetus exacuus	3	0.4	1.7	.
149	Psectrocladius	11	0.75	222.7	206.18
150	Pseudochironomus	3	1	360.0	.
151	Pseudosmittia	2	15.556	140.0	.
152	Rheotanytarsus	8	12.353	360.0	.
153	Rhyacodrilus coccineus	1	1.77	1.8	.
154	Saetheria	1	0.045	0.0	.
155	Sialis	2	0.056	1.8	.
156	Sphaerium	23	0.078	360.0	179.55
157	Stempellina	2	222.727	360.0	.
158	Stylaria fossularis	0	-	-	-
159	Thienemanniella	4	5.857	360.0	.
160	Trienodes	4	0.769	75.0	.
161	Vejdovskyella comata	2	15.455	222.7	.

Table 11: Phenanthrene - Species Screening Level Concentrations (ug/g organic carbon).

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
1	Ablabesmyia sp	23	1.25	1136.4	371.44
2	Aelosoma sp	0	-	-	-
3	Amnicola limosa	74	0.028	1136.4	187.04
4	Asellus sp	63	0.028	1136.4	260.74
5	Aulodrilus limnobius	5	10.588	60.7	.
6	Aulodrilus pigueti	21	6.522	692.9	359.24
7	Aulodrilus pleurisetia	36	1.053	139.1	97.21
8	Bithynia tentaculata	3	15.294	68.5	.
9	Branchiura sowerbyi	12	15	227.0	200.64
10	Caenis sp	20	1.458	935.4	213.71
11	Ceraclea sp	18	9.783	935.4	394.21
12	Chaetogaster diaphanus	3	14.545	117.1	.
13	Cheumatopsyche sp	27	0.025	935.4	584.47
14	Chironomus sp	71	0.412	2555.1	136.66
15	Cladopelma sp	9	0.833	244.2	.
16	Cladotanytarsus sp	12	0.028	448.3	351.62
17	Coelotanytarsus sp	19	0.023	227.0	118.00
18	Cricotopus sp	31	3.182	1136.4	435.62
19	Tribelos sp.	23	1.25	151.1	123.47
20	Cryptochironomus sp	92	0.023	1136.4	139.74
21	Dicortendipes sp	33	0.196	385.0	98.08
22	Eukiefferiella sp	1	1454.545	1454.5	.
23	Gammarus fasciatus	80	0.023	935.4	224.09
24	Glossiphonia heteroclita	5	0.769	341.8	.
25	Glossosoma sp	0	-	-	-
26	Glyptotendipes sp	14	0.061	68.5	55.79
27	Gyraulius parvus	25	0.333	448.3	174.80
28	Helisoma anceps	9	0.25	448.3	.
29	Heterotrissocladius sp	1	86	86.0	.
30	Hyalella azteca	30	0.196	448.3	218.30
31	Hydropsyche sp	31	0.333	1136.4	665.78
32	Hydroptila sp	5	10.588	448.3	.
33	Ilyodrilus templetoni	46	2.605	1721.6	477.36
34	Limnodrilus hoffmeisteri	187	0.023	2073.2	177.29
35	Limnodrilus sp	30	2.605	1721.6	731.27
36	Limnodrilus udekemianus	69	2.319	935.4	334.07
37	Lumbriculus variegatus	12	1.707	1136.4	848.30
38	Manayunkia speciosa	28	3.982	1136.4	570.92
39	Microtendipes sp	4	8.966	37.7	.
40	Mystacides sp	3	17.857	34.6	.
41	Nais behningi	2	25.217	97.1	.
42	Nais communis	7	0.412	2090.4	.
43	Nais variabilis	21	3.982	1136.4	497.13



Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
44	Nanocladius sp	24	7.037	935.4	625.12
45	Neureclipsis sp	7	12.222	935.4	.
46	Oecetis sp	22	0.319	1136.4	770.27
47	Parachironomus sp	27	7.037	448.3	344.26
48	Paralauterborniella sp	4	3.982	100.0	.
49	Paratendipes sp	5	6.522	1136.4	.
50	Phaenopsectra sp	17	0.333	2555.1	2169.54
51	Phallodrilus sp	0	-	-	-
52	Physella gyrina	60	0.333	935.4	326.29
53	Piguetiella michiganensis	0	-	-	-
54	Pisidium casertanum	29	0.025	176.2	21.54
55	Pisidium compressum	1	4.301	4.3	.
56	Pisidium conventus	1	130.606	130.6	.
57	Pisidium fallax	1	0.023	0.0	.
58	Pisidium henslowanum	0	-	-	-
59	Pisidium lilljeborgi	5	1.083	11.8	.
60	Pisidium nitidum	1	1.053	1.1	.
61	Pisidium variabile	1	2.8	2.8	.
62	Pleurocera acuta	0	-	-	-
63	Polypedium scalaenum	0	-	-	-
64	Polypedium sp	45	0.345	1136.4	307.71
65	Pontoporeia hoyi	3	2.258	70.4	.
66	Potamothrix moldaviensis	43	0.61	935.4	333.47
67	Potamothrix vej dovskiy	31	2.473	557.4	214.93
68	Pristina foreli	1	1.053	1.1	.
69	Pristina osborni	0	-	-	-
70	Procladius sp	164	0.023	2695.5	115.83
71	Prostoma rubrum	45	3.982	1136.4	453.96
72	Pseudocloeon sp	0	-	-	-
73	Quistadrilus multisetosus	100	0.023	1721.6	202.52
74	Slavina appendiculata	13	3.982	1136.4	704.64
75	Specaria josinae	2	18.182	1136.4	.
76	Sphaerium nitidum	0	-	-	-
77	Sphaerium striatinum	25	0.028	692.9	423.39
78	Spirosperma ferox	68	0.036	1136.4	263.97
79	Stenonema sp	2	139.118	385.0	.
80	Stictochironomus sp	10	6.522	448.3	441.96
81	Stylaria lacustris	23	7.037	557.4	364.63
82	Stylodrilus heringianus	21	6.522	935.4	665.78
83	Tanytarsus sp	37	0.061	1136.4	126.53
84	Thienemannimyia sp	19	0.025	448.3	100.00
85	Tubifex sp	2	6.522	557.4	.
86	Turbellaria	0	-	-	-
87	Uncinaiis uncinata	2	20	54.0	.
88	Valvata sincera	34	0.196	1136.4	216.17
89	Valvata tricarinata	24	0.333	256.2	128.54

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
90	Vejdovskyella intermedia	1	117.083	117.1	.
91	Elliptio complanata	1	32.222	32.2	.
92	Sphaerium simile	0	-	-	.
93	Chironomus plumosus	23	0.023	687.5	111.30
94	Cricotopus bicinctus	5	2.8	341.8	.
95	Ephemera sp	3	35	1136.4	.
96	Helobdella stagnalis	15	0.435	341.8	206.98
97	Hexagenia limbata	15	0.769	385.0	272.75
98	Hexagenia sp	34	0.345	1136.4	416.64
99	Tanytus sp	6	16.111	105.8	.
100	Tubifex tubifex	57	0.023	1136.4	109.60
101	Amphicaeta americana	3	1.2	86.0	.
102	Aulodrilus americanus	31	2.333	1136.4	522.91
103	Bithynia tentaculata	24	0.4	692.9	516.78
104	Caetogaster diastophus	1	58	58.0	.
105	Campeloma descisum	11	0.345	334.1	290.86
106	Chaoborus punctipennis	19	1.25	87.5	56.00
107	Chironomus semireductus	1	0.036	0.0	.
108	Chironomus thummi	16	0.061	2073.2	1035.10
109	Crangonyx	7	2.333	692.9	.
110	Crangonyx gracilis	1	1.075	1.1	.
111	Cricotopus festivellus	4	12.353	166.7	.
112	Cricotopus sylvestris	2	2.8	341.8	.
113	Cryptotendipes	5	10.333	256.2	.
114	Demicryptochironomus	12	6.522	1136.4	910.96
115	Endochironomus	30	0.028	341.8	33.55
116	Ferrissia rivularis	19	3.982	1136.4	935.39
117	Gammarus	11	3.982	448.3	388.84
118	Gammarus lacustris	7	0.028	44.3	.
119	Gammarus pseudolimnaeus	2	0.061	3.1	.
120	Glossiphonia complanata	8	0.4	24.1	.
121	Harnishia	18	3.982	256.2	189.25
122	Helobdella fusca	4	2.8	14.5	.
123	Helobdella lineata	2	1.2	9.6	.
124	Isochaetides curvisetosus	2	3.982	28.2	.
125	Isochaetides freyi	8	0.061	28.2	.
126	Limnodrilus angustipenis	2	0.61	334.1	.
127	Limnodrilus cervix	68	0.741	1721.6	118.06
128	Lirceus	11	10.588	448.3	386.62
129	Monodiamesa sp/depectina	5	12.353	1136.4	.
130	Nais brecheri	7	17.442	1136.4	.
131	Nais pardalis	4	25.217	1136.4	.
132	Nais simplex	6	3.982	107.5	.
133	Nilotanytus	1	30.556	30.6	.
134	Nyctiophylax	2	1.2	9.1	.
135	Orthocladus	8	0.25	151.1	.

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
136	Oxyethira	2	24.107	35.0	.
137	Pagastiella	3	35	448.3	.
138	Paratanytarsus	13	0.25	256.2	209.36
139	Phylocentropus	21	0.333	203.0	88.00
140	Pisidium	82	0.023	1721.6	369.72
141	Pisidium ferrugineum	3	6.786	24.1	.
142	Pisidium ventricosum	3	0.4	341.8	.
143	Pisidium walkeri	6	0.769	341.8	.
144	Polycentropus	14	0.61	139.1	86.03
145	Potthastia	2	0.714	1136.4	.
146	Potthastia longimana	2	0.345	11.8	.
147	Pristinella jenkiniae	2	7	60.9	.
148	Promenetus exacuus	3	0.435	21.5	.
149	Psectrocladius	11	1	1136.4	998.75
150	Pseudochironomus	3	11.75	86.0	.
151	Pseudosmittia	2	10.333	58.0	.
152	Rheotanytarsus	9	14.118	1136.4	.
153	Rhyacodrilus coccineus	1	3.982	4.0	.
154	Saetheria	0	-	-	-
155	Sialis	2	0.028	1.6	.
156	Sphaerium	24	0.036	1721.6	806.28
157	Stempellina	3	35	1136.4	.
158	Stylaria fossularis	1	35	35.0	.
159	Thienemanniella	4	58	1136.4	.
160	Trienodes	4	0.769	385.0	.
161	Vejdovskyella comata	2	18.182	1136.4	.

Table 12: Pyrene - Species Screening Level Concentrations (ug/g organic carbon).

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
1	Ablabesmyia sp	23	1.071	791.0	540.88
2	Aelosoma sp	0	-	-	-
3	Amnicola limosa	75	0.011	893.1	230.25
4	Asellus sp	65	0.011	893.1	199.42
5	Aulodrilus limnobius	5	38.596	126.0	.
6	Aulodrilus pigueti	21	9.565	873.6	682.01
7	Aulodrilus pleuriseta	36	1.071	214.0	183.49
8	Bithynia tentaculata	3	17.059	68.5	.
9	Branchiura sowerbyi	12	19.444	286.1	252.17
10	Caenis sp	20	1	893.1	144.32
11	Ceraclea sp	18	15.217	893.1	434.31
12	Chaetogaster diaphanus	3	35.455	214.0	.
13	Cheumatopsyche sp	27	0.042	893.1	818.50
14	Chironomus sp	73	0.3	2458.3	179.60
15	Cladopelma sp	9	0.833	208.9	.
16	Cladotanytarsus sp	12	0.028	193.1	179.78
17	Coelotanypus sp	19	0.031	148.0	139.00
18	Cricotopus sp	31	2.727	791.0	497.39
19	Tribelos sp.	23	1.071	134.1	102.03
20	Cryptochironomus sp	94	0.011	893.1	211.42
21	Dicretendipes sp	35	0.011	791.0	92.35
22	Eukiefferiella sp	1	2000	2000.0	.
23	Gammarus fasciatus	80	0.031	893.1	219.17
24	Glossiphonia heteroclita	5	0.526	35.9	.
25	Glossosoma sp.	0	-	-	-
26	Glyptotendipes sp	16	0.011	68.5	49.13
27	Gyraulius parvus	25	0.4	286.1	201.45
28	Helisoma anceps	9	0.333	193.1	.
29	Heterotrissocladius sp	1	300	300.0	.
30	Hyalella azteca	31	0.011	383.3	169.92
31	Hydropsyche sp	31	0.769	893.1	798.34
32	Hydroptila sp	5	35.455	193.1	.
33	Ilyodrilus templetoni	46	5	893.1	358.77
34	Limnodrilus hoffmeisteri	189	0.028	1758.4	208.89
35	Limnodrilus sp	30	4.4	1000.0	406.60
36	Limnodrilus udekemianus	70	3.097	1181.8	369.60
37	Lumbriculus variegatus	12	3.171	772.7	597.49
38	Manayunkia speciosa	28	3.097	873.6	792.38
39	Microtendipes sp	4	1	27.5	.
40	Mystacides sp	3	22.476	82.7	.
41	Nais behningi	2	53.043	104.3	.
42	Nais communis	8	0.875	1943.9	.
43	Nais variabilus	22	3.097	804.7	785.53

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
44	Nanocladus sp	24	10.741	893.1	839.15
45	Neureclipsis sp	7	11.111	893.1	.
46	Oecetis sp	22	0.234	893.1	785.53
47	Parachironomus sp	28	0.011	383.3	222.37
48	Paralauterborniella sp	4	3.097	95.1	.
49	Paratendipes sp	5	9.565	772.7	.
50	Phaenopsectra sp	18	3.097	2458.3	1828.40
51	Phalodrilus sp	0	-	-	-
52	Physella gyrina	60	0.39	893.1	282.06
53	Piguetiella michiganensis	0	-	-	-
54	Pisidium casertanum	30	0.011	151.5	27.75
55	Pisidium compressum	1	2.151	2.2	.
56	Pisidium conventus	1	165.303	165.3	.
57	Pisidium fallax	1	0.046	0.0	.
58	Pisidium henslowanum	0	-	-	-
59	Pisidium lilljeborgi	5	0.556	10.6	.
60	Pisidium nitidum	1	4.263	4.3	.
61	Pisidium variabile	1	2.12	2.1	.
62	Pleurocera acuta	0	-	-	-
63	Polypedium scalaenum	0	-	-	-
64	Polypedium sp	46	0.172	893.1	211.68
65	Pontoporeia hoyi	3	2.581	100.6	.
66	Potamothrix moldaviensis	43	0.39	893.1	559.84
67	Potamothrix vej dovskyi	31	0.986	804.7	240.75
68	Pristina foreli	1	4.263	4.3	.
69	Pristina osborni	0	-	-	-
70	Procladius sp	167	0.011	2009.2	147.39
71	Prostoma rubrum	45	3.097	893.1	780.04
72	Pseudocloeon sp	0	-	-	-
73	Quistadrilus multisetosus	100	0.031	1181.8	285.34
74	Slavina appendiculata	14	3.097	772.7	441.96
75	Specaria josinae	3	16.364	772.7	.
76	Sphaerium nitidum	0	-	-	-
77	Sphaerium striatinum	25	0.028	873.6	551.91
78	Spirosperma ferox	68	0.071	893.1	295.80
79	Stenonema sp	2	134.118	246.0	.
80	Stictochironomus sp	10	9.565	246.0	242.29
81	Stylaria lacustris	23	10.741	804.7	344.43
82	Stylodrilus heringianus	21	9.565	893.1	859.80
83	Tanytarsus sp	39	0.011	791.0	208.89
84	Thienemannimyia sp	21	0.042	193.1	85.12
85	Tubifex sp	2	9.565	804.7	.
86	Turbellaria	0	-	-	-
87	Uncinaiis uncinata	2	50	126.0	.
88	Valvata sincera	35	0.011	791.0	248.38
89	Valvata tricarinata	24	0.172	791.0	193.52

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
90	Vejdovskyaella intermedia	1	213.958	214.0	.
91	Elliptio complanata	1	48.889	48.9	.
92	Sphaerium simile	0	-	-	-
93	Chironomus plumosus	25	0.011	575.0	108.19
94	Cricotopus binctus	5	0.526	35.9	.
95	Ephemera sp	3	45	772.7	.
96	Helobdella stagnalis	16	0.011	214.0	167.79
97	Hexagenia limbata	15	0.4	246.0	202.25
98	Hexagenia sp	34	0.172	893.1	273.00
99	Tanyus sp	6	27.778	159.4	.
100	Tubifex tubifex	57	0.046	873.6	169.26
101	Amphicaeta americana	3	0.4	300.0	.
102	Aulodrilus americanus	31	1	893.1	787.35
103	Bithynia tentaculata	24	0.4	873.6	594.04
104	Cactogaster diastophus	1	64	64.0	.
105	Campeloma descium	11	0.172	383.3	366.67
106	Chaoborus punctipennis	19	0.3	126.8	49.00
107	Chironomus semireductus	1	0.071	0.1	.
108	Chironomus thummi	16	0.03	1758.4	1047.17
109	Crangonyx	7	3.667	873.6	.
110	Crangonyx gracilis	1	0.6	0.6	.
111	Cricotopus festivellus	4	18.235	197.0	.
112	Cricotopus sylvestris	2	0.526	2.1	.
113	Cryptotendipes	7	6.944	791.0	.
114	Demicryptochironomus	12	9.565	791.0	785.53
115	Endochironomus	31	0.011	51.8	36.33
116	Ferrissia rivularis	19	1	893.1	772.73
117	Gammarus	11	3.097	208.9	205.73
118	Gammarus lacustris	8	0.011	35.9	.
119	Gammarus pseudolimnaeus	3	0.029	2.2	.
120	Glossiphonia complanata	8	0.4	41.8	.
121	Harmishia	19	3.097	1181.8	791.01
122	Helobdella fusca	4	2.12	35.5	.
123	Helobdella lineata	2	0.4	12.0	.
124	Isochaetides curvisetosus	2	3.097	82.7	.
125	Isochaetides freyi	8	0.03	82.7	.
126	Limnodrilus angustipenis	2	0.39	383.3	.
127	Limnodrilus cervix	68	0.741	1181.8	209.40
128	Lirceus	11	34.118	300.0	278.62
129	Monodiamesa sp/depectina	5	18.235	791.0	.
130	Nais bretheri	7	40.698	772.7	.
131	Nais pardalis	4	52.034	772.7	.
132	Nais simplex	6	3.097	286.1	.
133	Nilotanyus	1	30.556	30.6	.
134	Nyctiophylax	2	0.4	1.0	.
135	Orthocladus	8	0.333	208.9	.



Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
136	Oxyethira	2	41.786	45.0	.
137	Pagastiella	3	45	300.0	.
138	Paratanytarsus	13	0.333	791.0	528.25
139	Phylocentropus	21	1.333	278.8	91.60
140	Pisidium	83	0.031	893.1	357.62
141	Pisidium ferrugineum	3	9.194	41.8	.
142	Pisidium ventricosum	3	0.4	0.5	.
143	Pisidium walkeri	6	0.526	35.9	.
144	Polycentropus	14	0.39	134.1	105.88
145	Potthastia	2	0.5	772.7	.
146	Potthastia longimana	2	0.172	10.6	.
147	Pristinella jenkiniae	2	7	56.3	.
148	Promenetus exacuouus	3	0.435	18.9	.
149	Psectrocladius	11	0.55	772.7	657.58
150	Pseudochironomus	3	10.55	300.0	.
151	Pseudosmittia	3	6.944	64.0	.
152	Rheotanytarsus	9	34.118	772.7	.
153	Rhyacodrilus coccineus	1	3.097	3.1	.
154	Saetheria	1	0.011	0.0	.
155	Sialis	2	0.028	1.1	.
156	Sphaerium	25	0.031	772.7	402.79
157	Stempellina	3	45	772.7	.
158	Stylaria fossularis	1	45	45.0	.
159	Thienemanniella	4	52.857	772.7	.
160	Trienodes	4	0.769	246.0	.
161	Vejdovskiyella comata	3	16.364	772.7	.

Table 13: Total PAH - Species Screening Level Concentrations (ug/g organic carbon).

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
1	Ablabesmyia sp	21	22.5	15181.8	4100.58
2	Aelosoma sp	0	-	-	-
3	Amnicola limosa	74	0	7750.0	1342.59
4	Asellus sp	64	0	15181.8	1609.71
5	Aulodrilus limnobius	6	0.361	1023.0	.
6	Aulodrilus pigueti	23	0	4880.9	3598.12
7	Aulodrilus pleuriseta	39	0	2666.7	974.67
8	Bithynia tentaculata	10	0	1999.7	1870.48
9	Branchiura sowerbyi	11	136.944	2052.1	1861.41
10	Caenis sp	23	0	6657.7	940.51
11	Ceraclea sp	16	104.891	6657.7	3933.72
12	Chaetogaster diaphanus	3	253.182	4360.0	.
13	Cheumatopsyche sp	27	0.833	6657.7	4968.10
14	Chironomus sp	82	0	15181.8	1872.68
15	Cladopelma sp	10	0	974.7	947.99
16	Cladotanytarsus sp	14	0.361	4360.0	2678.04
17	Coelotanytarsus sp	17	0.906	1098.5	908.90
18	Cricotopus sp	30	0	7750.0	2842.61
19	Tribelos sp.	24	9.25	15181.8	590.42
20	Cryptochironomus sp	103	0	7750.0	1906.00
21	Dicretendipes sp	39	0	7750.0	822.22
22	Eukiefferiella sp	1	10904.54	10904.5	.
23	Gammarus fasciatus	94	0	11088.9	1609.71
24	Glossiphonia heteroclita	6	0	1999.7	.
25	Glossosoma sp	0	-	-	-
26	Glyptotendipes sp	15	0.182	707.9	560.65
27	Gyraulus parvus	23	0	2052.1	1231.78
28	Helisoma anceps	4	7	253.2	.
29	Heterotrissocladius sp	1	7750	7750.0	.
30	Hyalella azteca	31	0	2766.3	986.46
31	Hydropsyche sp	31	0	15181.8	5412.82
32	Hydrotilla sp	4	233.793	341.8	.
33	Ilyodrilus templetoni	45	24.711	7774.8	1880.16
34	Limnodrilus hoffmeisteri	217	0	11088.9	1516.23
35	Limnodrilus sp	32	16.16	7774.8	3372.59
36	Limnodrilus udekemianus	74	0	8488.2	2659.15
37	Lumbriculus variegatus	8	21.585	1060.9	.
38	Manayunkia speciosa	28	104.891	15181.8	5779.95
39	Microtendipes sp	4	38.45	204.2	.
40	Mystacides sp	4	0	564.5	.
41	Nais behningi	2	375.652	661.9	.
42	Nais communis	4	302.727	15181.8	.
43	Nais variabilis	22	0	15181.8	5357.01

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
44	Nanocladius sp	23	70.185	6657.7	5264.58
45	Neureclipsis sp	7	79.167	6657.7	.
46	Oecetis sp	20	0	15181.8	7640.77
47	Parachironomus sp	27	0.182	2766.3	1444.74
48	Paralauterborniella sp	2	40.889	564.5	.
49	Paratendipes sp	4	40.889	233.8	.
50	Phaenopsectra sp	17	0	15181.8	13007.10
51	Phalodrilus sp	0	-	-	-
52	Physella gyrina	60	0	6657.7	2046.89
53	Piguetiella michiganensis	1	0	0.0	.
54	Pisidium casertanum	29	0	931.7	261.73
55	Pisidium compressum	0	-	-	-
56	Pisidium conventus	1	1364.545	1364.5	.
57	Pisidium fallax	1	1.062	1.1	.
58	Pisidium henslowanum	0	-	-	-
59	Pisidium lilljeborgi	2	13.6	71.7	.
60	Pisidium nitidum	1	28.233	28.2	.
61	Pisidium variabile	1	32.06	32.1	.
62	Pleurocera acuta	1	261.733	261.7	.
63	Polypedilum scalaenum	0	-	-	-
64	Polypedilum sp	48	0	15181.8	1844.15
65	Pontoporeia hoyi	5	0	2552.0	.
66	Potamothrix moldaviensis	45	0	6657.7	2684.14
67	Potamothrix vej dovskiy	29	0	5561.1	1765.50
68	Pristina foreli	1	0	0.0	.
69	Pristina osborni	0	-	-	-
70	Procladius sp	181	0	15181.8	991.80
71	Prostoma rubrum	40	69.783	6657.7	4614.51
72	Pseudocloeon sp	1	0	0.0	.
73	Quistadrilus multisetosus	109	0	11088.9	2066.36
74	Slavina appendiculata	12	158.333	15181.8	10921.06
75	Specaria josinae	3	0	302.7	.
76	Sphaerium nitidum	0	-	-	-
77	Sphaerium striatinum	22	0	5561.1	4203.79
78	Spirosperma ferox	67	0	15181.8	3085.04
79	Stenonema sp	2	576.622	1765.5	.
80	Stictochironomus sp	15	0	4360.0	2803.30
81	Stylaria lacustris	25	0	5561.1	2337.80
82	Stylodrilus heringianus	22	69.783	6657.7	5357.01
83	Tanytarsus sp	43	0	15181.8	1922.92
84	Thienemannimyia sp	22	0	15181.8	6733.00
85	Tubifex sp	2	69.783	5561.1	.
86	Turbellaria	0	-	-	-
87	Uncinails uncinata	3	0	871.0	.
88	Valvata sincera	31	0	15181.8	4168.84
89	Valvata tricarinata	26	0	4880.9	1115.28

Spp. No.	Species	N =	Minimum	Maximum	Concentration 90th percentile
90	Vejdovskya intermedia	1	1320.625	1320.6	.
91	Elliptio complanata	2	142.944	331.9	.
92	Sphaerium simile	0	-	-	-
93	Chironomus plumosus	30	0	3649.4	385.02
94	Cricotopus bicinctus	3	122.718	261.7	.
95	Ephemera sp	0	-	-	-
96	Helobdella stagnalis	20	0	11088.9	1931.76
97	Hexagenia limbata	16	0	1765.5	1155.42
98	Hexagenia sp	34	2.414	15181.8	4211.60
99	Tanytus sp	7	120.278	916.5	.
100	Tubifex tubifex	64	0	4819.9	885.41
101	Amphicaeta americana	6	0	15181.8	.
102	Aulodrilus americanus	30	0	6657.7	4598.02
103	Bithynia tentaculata	15	74.69	5561.1	5116.34
104	Caetogaster diastophus	0	-	-	-
105	Campeloma descium	12	0	7750.0	6254.89
106	Chaoborus punctipennis	25	0	791.4	336.49
107	Chironomus semireductus	1	1.307	1.3	.
108	Chironomus thummi	7	0.606	9897.4	.
109	Crangonyx	7	29.167	4819.9	.
110	Crangonyx gracilis	1	12.35	12.4	.
111	Cricotopus festivellus	6	132.353	15181.8	.
112	Cricotopus sylvestris	2	32.06	1999.7	.
113	Cryptotendipes	7	0	4880.9	.
114	Demicyptochironomus	16	0	15181.8	9979.55
115	Endochironomus	29	0	532.2	199.00
116	Ferrissia rivularis	18	0	6657.7	2254.72
117	Gammarus	10	66.333	974.7	956.34
118	Gammarus lacustris	6	0	261.7	.
119	Gammarus pseudolimnaeus	3	0.6	2.0	.
120	Glossiphonia complanata	8	0	243.2	.
121	Harnishia	18	0	8488.2	7823.82
122	Helobdella fusca	4	32.06	253.2	.
123	Helobdella lineata	1	9.2	9.2	.
124	Isochaetides curvisetosus	1	564.545	564.5	.
125	Isochaetides freyi	7	0	564.5	.
126	Limnodrilus angustipenis	2	10.341	2766.3	.
127	Limnodrilus cervix	89	0	11088.9	2052.14
128	Lirceus	10	106.444	7750.0	7077.73
129	Monodiamesa sp/depectina	7	0	15181.8	.
130	Nais bretcheri	5	264.535	2052.1	.
131	Nais pardalis	4	146.2	482.9	.
132	Nais simplex	5	136.944	2052.1	.
133	Nilotanytus	1	483.333	483.3	.
134	Nyctiophylax	2	9.2	38.5	.
135	Orthocladus	8	7	974.7	.

Spp. No.	Species	N=	Minimum	Maximum	Concentration 90th percentile
136	Oxyethira	2	40.889	243.2	.
137	Pagastiella	3	0	7750.0	.
138	Paratanytarsus	14	8.7	4880.9	3440.28
139	Phylocentropus	19	0	2066.4	512.94
140	Pisidium	82	0.906	7774.8	2847.54
141	Pisidium ferrugineum	4	74.69	243.2	.
142	Pisidium ventricosum	3	0	1999.7	.
143	Pisidium walkeri	7	0	1999.7	.
144	Polycentropus	15	0	576.6	538.41
145	Potthastia	2	21.143	15181.8	.
146	Potthastia longimana	5	0.361	146.2	.
147	Pristinella jenkiniae	1	57	57.0	.
148	Promenetus exacuus	4	0	122.7	.
149	Psectrocladius	9	0	15181.8	.
150	Pseudochironomus	4	0	7750.0	.
151	Pseudosmittia	1	4	4.0	.
152	Rheotanytarsus	11	0	15181.8	13695.46
153	Rhyacodrilus coccineus	0	-	-	-
154	Saetheria	1	0.182	0.2	.
155	Sialis	2	0	0.4	.
156	Sphaerium	23	0	15181.8	5472.29
157	Stempellina	3	40.889	15181.8	.
158	Stylaria fossularis	2	0	40.9	.
159	Thienemanniella	0	-	-	-
160	Trienodes	3	0	1765.5	.
161	Vejdovskyella comata	1	302.727	302.7	.

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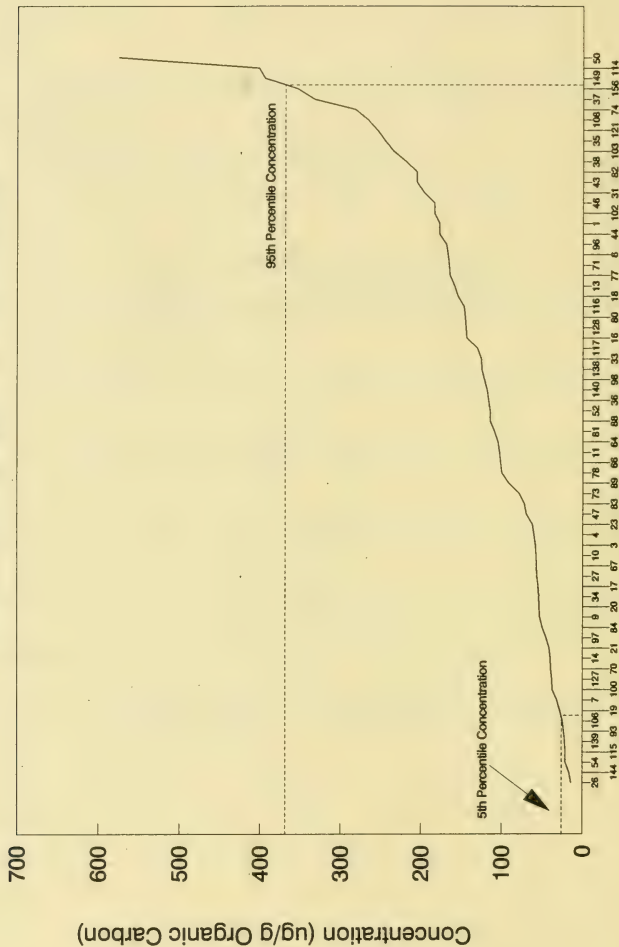
## **APPENDIX II - FIGURES**

### **Calculation of the 5th and 95th Percentiles of the Species Screening Level Concentrations**

- Concentrations are expressed on the basis of unit mass per mass of organic carbon.
- Species numbers correspond to those in the tables in Appendix I

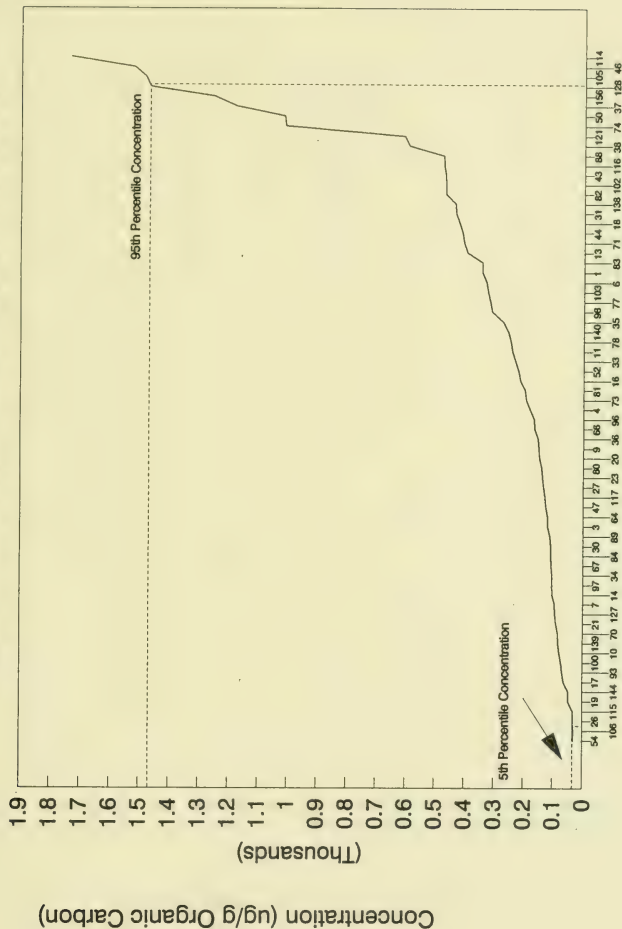


Fig 1. SLC Graph For Anthracene



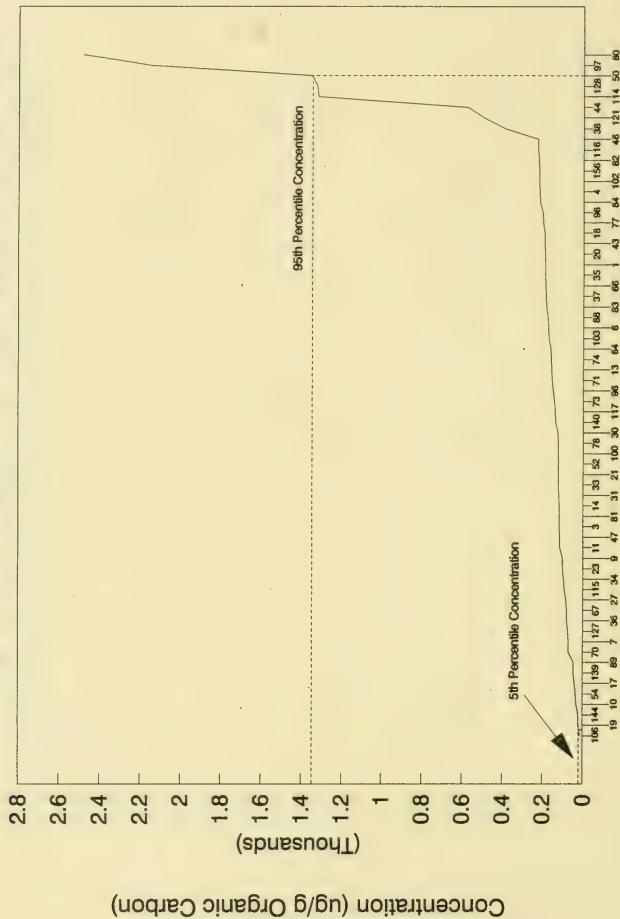
Species Number

Fig 2. SLC Graph For Benz[a]anthracene



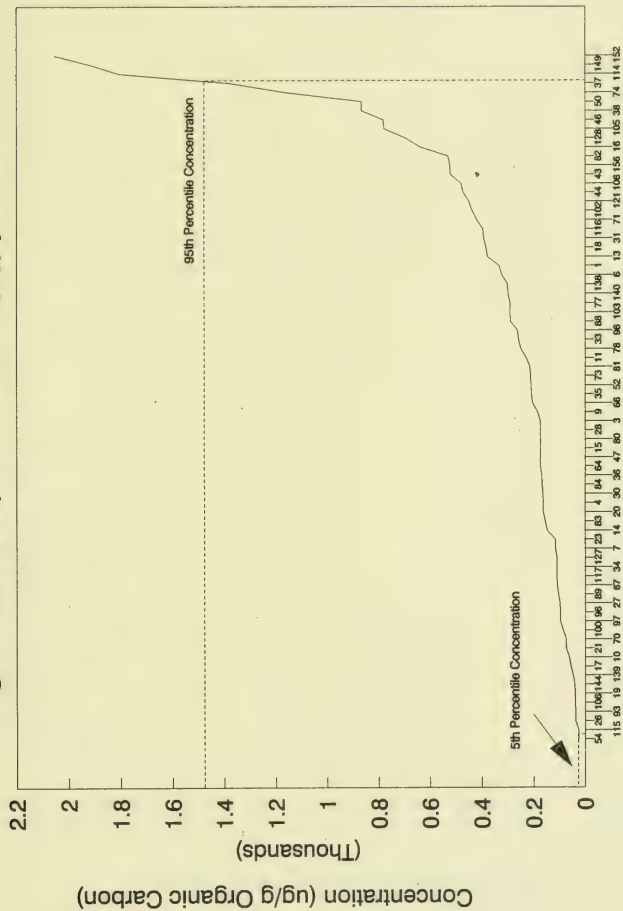
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Fig 3. SLC Graph For Benzo[k]fluoranthene



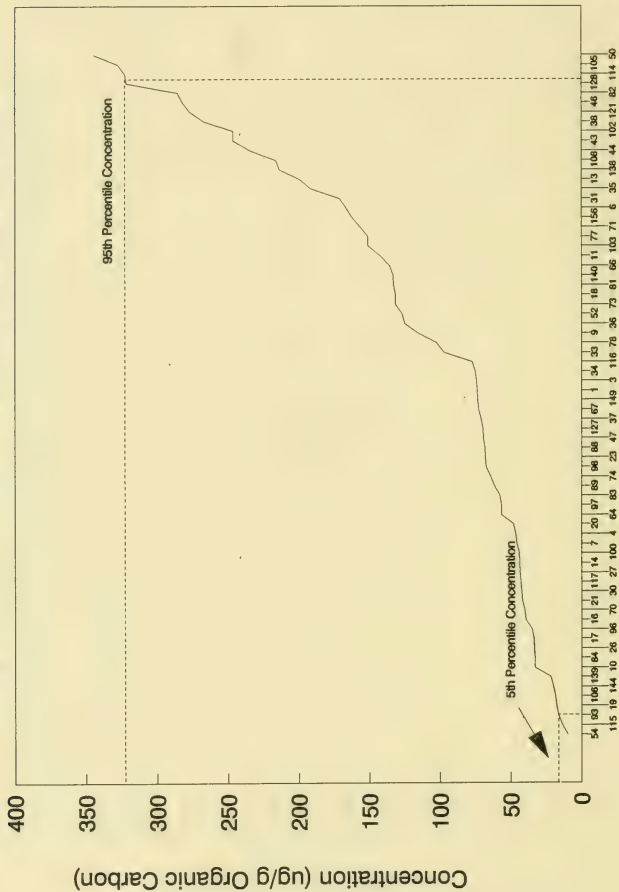
Species Number

Fig 4. SLC Graph For Benzo[a]pyrene



Species Number

Fig 5. SLC Graph For Benzo[ghi]perylene



Species Number



Ministry  
of the  
Environment  
Ontario

Fig 6. SLC Graph For Chrysene



Species Number

Fig 7. SLC Graph For Dibenzo[ah]anthracene

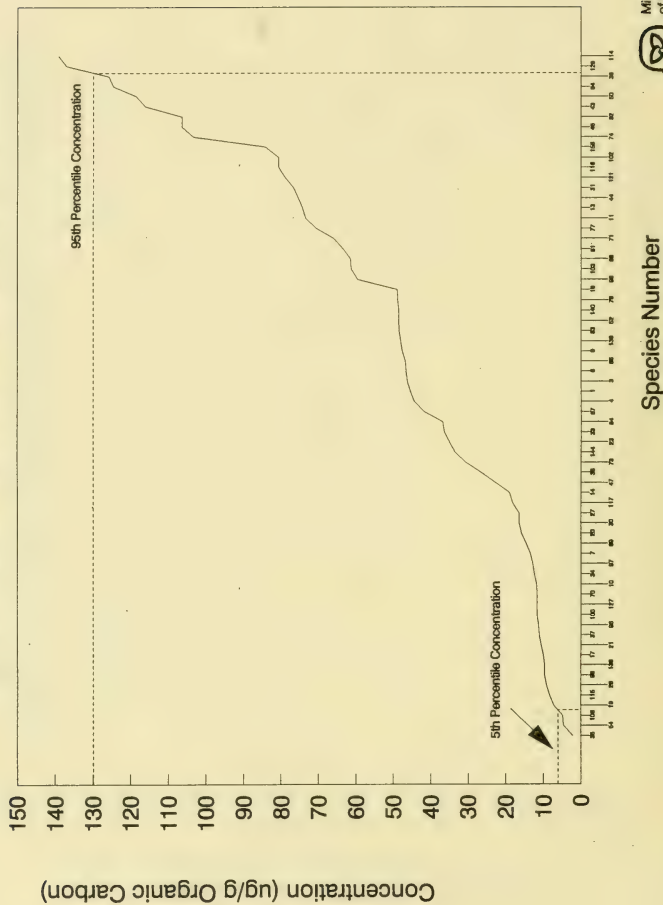
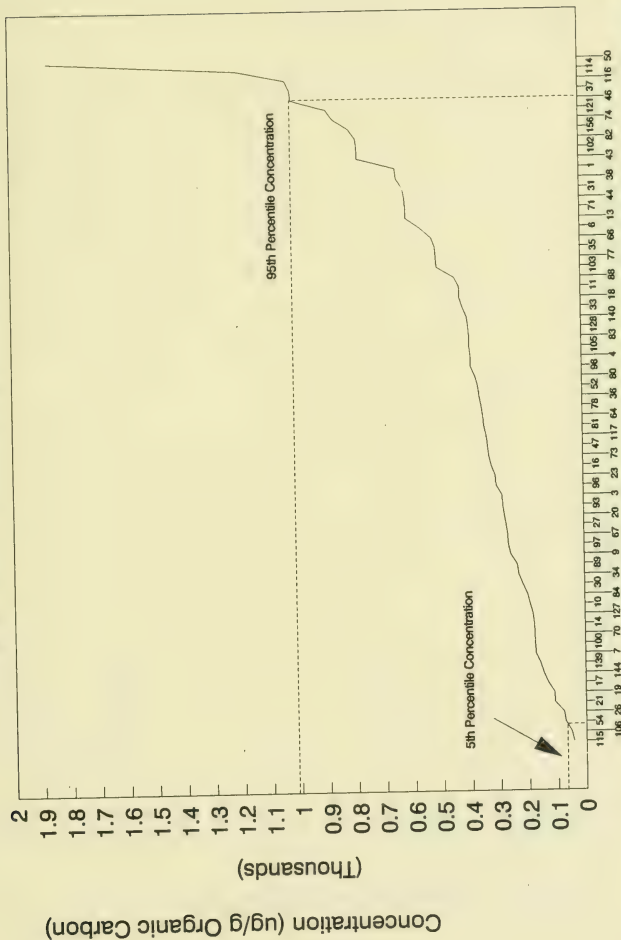


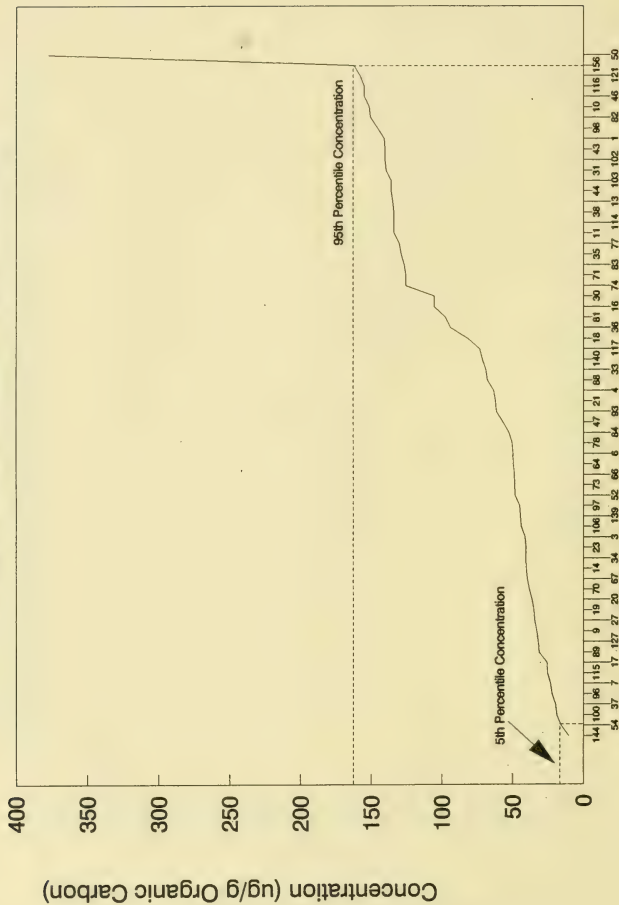


Fig 8. SLC Graph For Fluoranthene



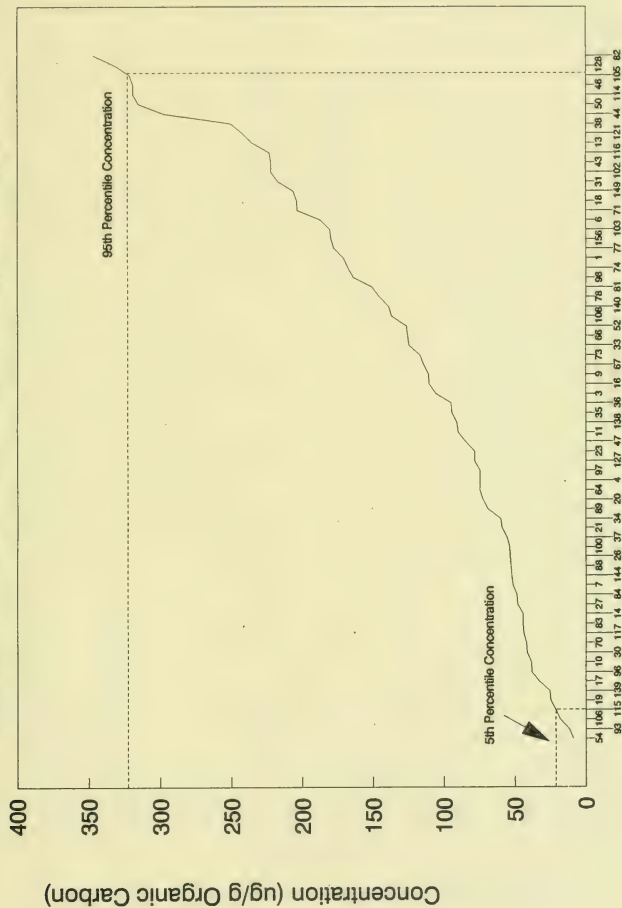
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Fig 9. SLC Graph For Fluorene



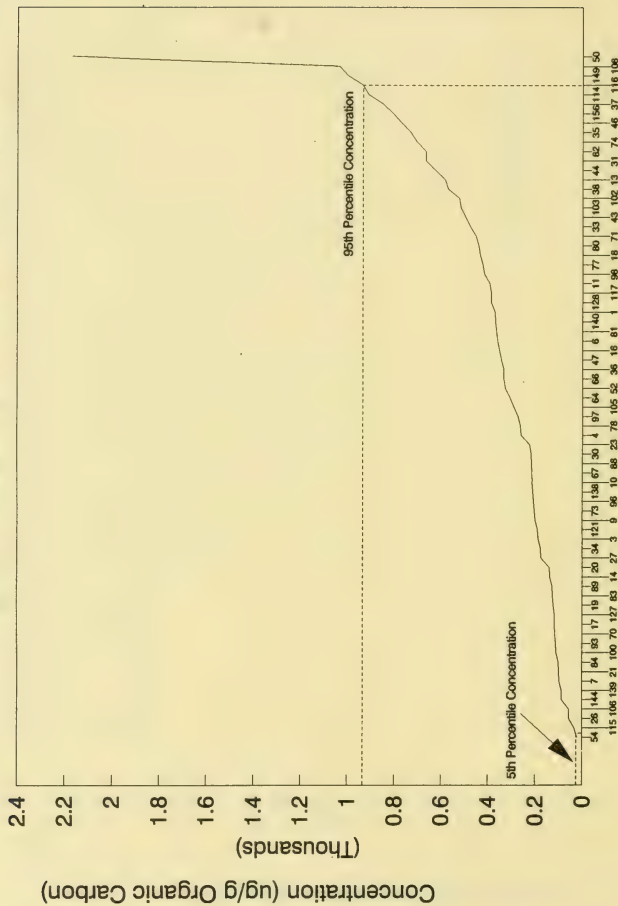
Species Number

Fig 10. SLC Graph For Indeno[123-cd]pyrene



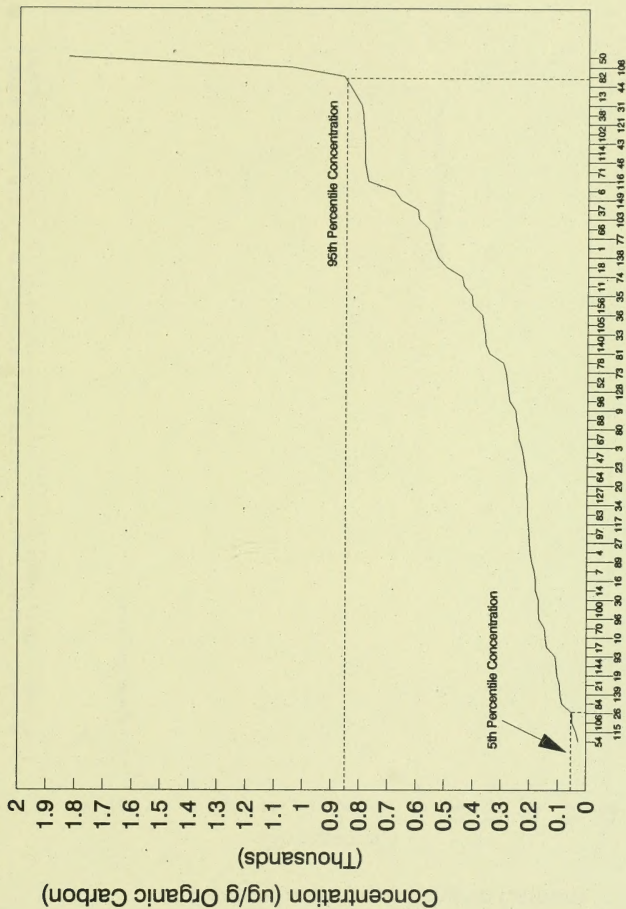
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Fig 11. SLC Graph For Phenanthrene



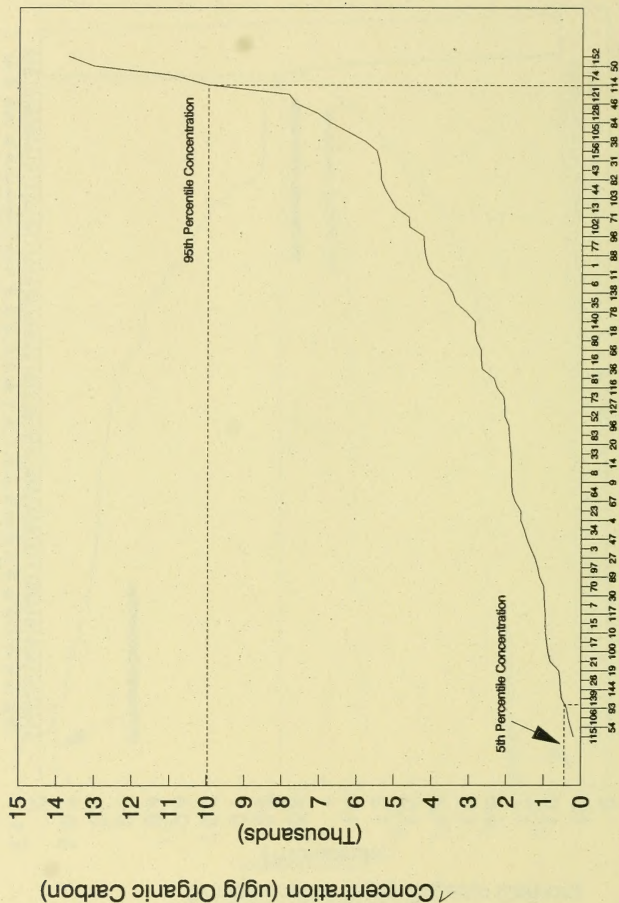
Species Number

Fig 12. SLC Graph For Pyrene



Species Number

Fig 13. SLC Graph For Total PAHs



Species Number





